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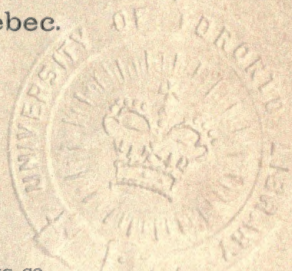


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No. 1.

DESCRIPTIONS OF SOME NEW CANADIAN BRACONIDÆ.

BY WM. H. ASHMEAD, BERLIN, PRUSSIA.

The interesting new species of Braconidæ described below, unless otherwise stated, were all captured by my good friend Mr. W. Hague Harrington, at Ottawa, Canada.

BRACON FABR.

(1) *Bracon brachyurus* n. sp.

♀.—Length $2\frac{4}{5}$ mm. ; ovip. $\frac{1}{5}$ mm. Black, polished ; mandibles, palpi and legs, except the posterior coxæ and the basal two-thirds of their femora, yellowish-brown. Tegulæ honey-yellow. The head is transverse, the cheeks rounded off posteriorly. Antennæ 22-jointed. The parapsides are not sharply defined, only indicated by slight depressions in the mesonotal surface. Metathorax finely rugose with a delicate median keel. Abdomen oval, depressed, the 1st and 2nd segments wrinkled or slightly rugose, the segments beyond smooth, shining, and all of nearly an equal length. Wings hyaline, the venation brown ; the recurrent nervure is not interstitial with the 1st transverse cubital, and the 2nd branch of the radius is about twice the length of the 1st.

Described from a single specimen.

(2) *Bracon melanaspis* n. sp.

♀.—Length $2\frac{3}{5}$ mm. ; ovip. $\frac{3}{5}$ m.m. Black, polished ; mandibles, palpi and legs, except the posterior pair which are entirely black except the apex of the femora, and extreme apex of abdomen, brownish-yellow. The wide lateral membranous portion of 1st abdominal segment, pale yellow. The head as in the previous species. Antennæ very long 28-jointed. Tegulæ black. Parapsidal grooves not sharply defined, and fringed with long hairs. The scutellum is also sparsely pubescent. Metathorax and pleuræ smooth, shining. Abdomen oval, the 1st segment with a smooth, black shield, the sides of which are parallel and the disk

with a slight elevation. Wings greyish-hyaline, due to the pubescence, venation brown, the 1st branch of the radius more than half as long as the 2nd, the recurrent nervure not interstitial with the 1st transverse cubital.

Described from one specimen.

(3) *Bracon nigridorsum* n. sp.

♀.—Length $3\frac{1}{2}$ mm.; ovip. $\frac{4}{5}$ mm. Black, polished; mandibles, palpi, legs, including coxæ, and the abdomen, except the disk of 1st, 2nd, 3rd, 4th and 5th segments, which are black, wholly pale brownish-yellow. Tegulæ honey-yellow. Antennæ 35-jointed. Parapsides distinct. Metathorax and mesopleuræ smooth, polished, the latter with a single fovea near the posterior suture. Metapleuræ very hairy. Abdomen long oval, the shield of the 1st segment trapezoidal, finely rugose, rounded off at apex and between it and the lateral margins of the segment are two long channels; the 2nd segment is slightly shagreened at base. Wings hyaline, strongly iridescent, the venation brown; the 2nd branch of the radius is twice the length of the 1st, the recurrent nervure not interstitial.

SPATHIUS NEES.

(4) *Spathius Canadensis* n. sp.

♀.—Length $2\frac{4}{5}$ mm.; ovip. $1\frac{2}{3}$ mm. Reddish-brown, the dorsum of thorax blackish or dark fuscous, the abdomen, except the long petiole and the base of the 2nd segment, black. The antennæ are honey-yellow, very long, multiarticulate, the posterior femora and tibiæ slightly fuscous. Head perfectly smooth, polished; the thorax delicately shagreened, the parapsidal grooves very distinct, deep; the metathorax with 3 or 4 delicate longitudinal carinæ. Wings fuscous, the base and tips hyaline and with a white or hyaline band across the middle, including the basal half of the stigma.

Described from one specimen. The species comes nearest to *L. Laflammei* Prov., but is readily separated from it and other species by its smaller size, perfectly smooth head and by the brevity of the ovipositor.

CÆNOPHANES FÖRSTER.

(5) *Cænophanes borealis* n. sp.

♀.—Length $3\frac{3}{5}$ mm.; ovip. $\frac{4}{5}$ mm. Very elongate, black, finely rugose; the quadrate head is smooth, but with delicate transverse aciculations on

the vertex ; the apical portion of 3, 4 and 5 abdominal segments, two-thirds of the 6th and the 7th wholly smooth and polished. Antennæ honey-yellow, long and slender. Legs brownish-yellow, the posterior coxæ black, the anterior and middle pairs more or less dusky basally. Parapsidal grooves distinct, the middle lobe with a median longitudinal furrow. Wings hyaline, the venation as usual, the 1st transverse cubital vein obliterated.

Described from one specimen.

RHOGAS NEES.

(6) *Rhogas mellipes* n. sp.

♂.—Length $3\frac{1}{2}$ mm. Black ; Antennæ 29-jointed, brown ; mandibles, palpi and apical abdominal segment white ; legs, including coxæ uniformly pale honey-yellow. Head smooth, polished, the face with some sparse hairs. Thorax with parapsides distinct, the three lobes, except the middle lobe posteriorly just in front of the scutellum where it is coarsely rugose, are smooth and polished. Scutellum rufous. The upper portion of the mesopleuræ and the metathorax coarsely rugose. Abdomen, except the three basal segments which are coarsely longitudinally striated, smooth, shining ; the apical edge of the 3rd segment is tinged with rufous. Wings hyaline, the venation pale brown ; the second branch of the radius is only slightly longer than the 1st.

Described from one specimen.

MICROPLITIS FÖRSTER.

(7) *Microplitis cincta* n. sp.

♂.—Length $3\frac{2}{5}$ mm. Black, opaque, rugoso-punctate, and with a sparse, short pubescence ; the palpi, legs, the membranous portion of the 1st, and 2nd and 3rd abdominal segments reddish-yellow ; the posterior coxæ basally, a small spot at extreme tips of their femora and tarsi fuscous ; the apical joints of antennæ and the middle tarsi are also fuscous. Antennæ 18-jointed, black, except as mentioned, longer than the body, the 1st two joints of flagellum of about an equal length, and slightly longer than the joints beyond. Parapsides indicated slightly posteriorly. Mesopleuræ with an oblique groove on the disk. Metathorax coarsely rugose without carinæ, except two slight ones laterally extending in the form of an indistinct channel from the rounded spiracles. Abdomen

oval, depressed, smooth and shining; the shield of the 1st segment linear, and with the posterior corners rounded off. Wings hyaline, the stigma and most of the costæ, brown-black, the other veins brown; areolet large, closed.

Described from one specimen.

This species comes nearest to *M. mamestræ* Weed.

OPIUS WESMAEL.

(8) *Opius Canadensis* n. sp.

♂.—Length $2\frac{2}{3}$ mm. Black, polished; the orbits broadly, the face wholly, the scape and two or three flagellar joints beneath, legs, including coxæ, the lateral or membranous portion of 1st and 2nd abdominal segments, and the suture between the 2nd and 3rd, all honey-yellow; the posterior tibiæ apically and their tarsi slightly dusky. Antennæ as long as the body, 35-jointed, brown. Wings hyaline, the venation brown, the recurrent nervure almost interstitial with the first transverse cubital, the median and submedian cells of an equal length. Metathorax smooth, with some sparse, long bristles scattered over its surface. The shield of the 1st abdominal segment is longer than wide, smooth, the disk impressed, the sides parallel; the 2nd and 3rd segments are slightly rugose, the following smooth, shining, sparsely hairy.

Described from one specimen.

(9) *Opius bicarinatus* n. sp.

♂.—Length $3\frac{2}{5}$ mm. Robust, black, shining and pubescent. Head broad, rugosely punctate; face with glittering pile; palpi and legs pale rufous, the posterior coxæ black. The thorax has the parapsidal grooves coarsely indicated and punctured at bottom, across the base of the scutellum is a deep broad fovea, while the pleuræ are rugoso-punctate. The metathorax is finely rugose, and there is a large fovea on each side of the post scutellum. Abdomen oval, depressed, rufous, the base and apex black; the 1st segment is the longest with two carinæ on the disk and rugose, the 2nd segment is also rugose, while the following segments are smooth and covered with fine hairs. Wings hyaline, the venation dark brown; the 2nd submarginal cell is much narrowed at apex, from an exceedingly short 2nd transverse cubital nervure, and this will be found to be a good character to distinguish the species.

Described from one specimen.

IDIASTA FÖRSTER.

(10) *Idiasta macrocera* n. sp.

♂.—Length $3\frac{2}{3}$ mm. Black, highly polished, the second abdominal segment with a rufous stain. Antennæ 40-jointed, nearly twice as long as the body, brown, the scape and 2nd joint red, the 4th about one-third longer than the 3rd. Palpi pale; mandibles and legs red. Thorax with the parapsidal grooves indicated only anteriorly by short, punctate lines, a grooved line on the shoulders and a fovea just in front of the scutellum. The scutellum has at base two large foveæ separated by a slight carina. Mesopleuræ smooth, with a broad punctate space between them and the mesopectus. Metathorax coarsely rugose. Abdomen ovate, and excepting the petiole, which is longitudinally striated, smooth and polished. Wings hyaline, the stigma very large, ovate, brown, the veins paler.

Described from one specimen.

APHIDIUS NEES.

(11) *Aphidius macrogaster* n. sp.

♂.—Length $3\frac{1}{2}$ mm. Head, thorax and legs rufous; the anterior legs slightly yellowish. The abdomen is very long, lanceolate, slightly more than twice the length of the head and thorax combined, terminating in a small curved prong. Antennæ 20-jointed, brown, the joints of the flagellum about twice as long as thick. The mesonotum exhibits some fine longitudinal aciculations just in front of the scutellum and the parapsidal grooves are present, otherwise it is smooth and shining. Wings hyaline, the venation brown; the 2nd branch of the radius is about as long as the transverse cubital nervure.

Described from one specimen.

The species approaches nearest to *A. bicolor* Ashm.; but that species is larger, the head black, and the sculpture of the mesonotum is different.

(12) *Aphidius crassicornis* n. sp.

♂.—Length $2\frac{1}{8}$ mm. Black polished; clypeus piceous; mandibles, palpi, two basal antennal joints and legs, yellow, the middle and posterior tibiæ and tarsi slightly obfuscated. Antennæ 21-jointed, stouter than usual and remarkable for the shortness of the flagellar joints, which are hardly longer than wide and readily separate the species from all other described forms. The abdomen, except a rufous tinge on the 2nd seg-

ment, is black, smooth, the petiole being slightly roughened and about twice as long as wide. Wings hyaline, the venation brown.

Described from one specimen. A ♀ named in ms. *A. brevicornis*, but which I now believe to be the opposite sex of the above species, agrees with it in colour, but has unusually short, 16-jointed antennæ that do not extend beyond the apex of the metathorax, and while the flagellar joints are also short, they are yet distinctly longer than wide.

The opportunity is taken here to describe three other species in this genus, which have been long in my collection, as follows:—

(13) *Aphidius pinaphidis* n. sp.

♂ ♀.—Length $2\frac{2}{5}$ to 3 mm. Brownish-yellow; in the ♂ the occiput, disks of metathorax and abdomen are black or blackish; in the ♀ only the abdomen shows a dark blotch or shade above toward the tip, otherwise it is wholly brownish-yellow. The ♂ antennæ are 25-jointed, the ♀ 16-jointed, and in both sexes the flagellum is black, the joints being longer than wide, while the mesonotum is distinctly punctate. Wings hyaline, venation as usual brown.

Hab.—Jacksonville, Fla.

Described from several specimens reared by me many years ago from the pine aphid *Lachnus Australis*.

(14) *Aphidius bifasciatus* n. sp.

♀.—Length $2\frac{1}{8}$ mm. Brownish-yellow; the abdomen and flagellum black, the petiole yellowish.

This species has 20-jointed antennæ, a peculiar shagreened punctuation, no parapsidal grooves, two transverse brown bands on the anterior wings, and thickened or swollen posterior femora.

Hab.—Jacksonville, Fla.

Described from a single specimen reared from the pine aphid. The banded front wings and the swollen posterior thighs readily distinguish the species.

(15) *Aphidius nigriceps* n. sp.

♂.—Length $2\frac{2}{5}$ to $2\frac{1}{4}$ mm. Bright yellow testaceous, smooth and polished; the head above and the disk of the mesonotum black. Sometimes the disk of two or three of the abdominal segments also show dusky blotches or shades. The antennæ are 21 or 22-jointed, very long, black, except the two basal joints; the flagellar joints are about twice as long as

thick and delicately fluted. The mesonotal grooves are wanting. Metathorax areolated. The abdominal petiole is about two and a-half times as long as wide, finely rugose and with a slight constriction at about the middle above. The middle and posterior tarsi are slightly dusky. Wings hyaline, the venation pale, the 2nd branch of the radius longer than the transverse cubital nervure.

Described from two specimens taken by Mr. E. A. Schwarz, at Oakland, Md.

LIPOLEXIS FÖRSTER.

(16) *Lipolexis fuscicornis* n. sp.

♀.—Length $1\frac{2}{5}$ mm. Black, polished; mandibles, palpi, two basal joints of antennæ base of third, legs and petiole flavo-testaceous, the 2nd abdominal segment piceous. Face scaly. Antennæ 12-jointed, the flagellum slightly thickened toward tip, fuscous, the joints twice as long as thick. Wings hyaline, the venation brown, the radius unusually long and almost forming a closed radial cell.

Taken at Ottawa. This is the only species to be described in this genus with 12-jointed antennæ, and this character, with the long radial vein, will readily distinguish it from the several other species now placed here.

HISTEROMERUS WESMAEL.

(17) *Histeromerus Canadensis* n. sp.

♀.—Length $2\frac{1}{5}$ mm.; ovip. $\frac{2}{5}$ mm. Black, polished; collar and prosternum flavo-testaceous; legs yellowish-red. The oblong head is a little longer than wide, a little wider behind than in front, smooth and polished, except some punctures above the clypeus. Antennæ 15-jointed, and when extended backward extend only to the tegulæ. The dorsum of thorax is flattened, the parapsidal grooves indicated only anteriorly by some punctures. The abdomen is as long as the head and thorax together, compressed, black, the sutures of the ventral segments tinged with yellow. Wings subhyaline, somewhat narrowed, the veins brown; the 2nd submarginal cell is long and rather narrow, about one-third longer than the 3rd; the recurrent nervure enters the 2nd submarginal cell at its lower posterior angle.

Described from a single specimen. Its smaller size, colour and the paucity of joints in the antennæ, will at once separate it from *H. mystacinus* Wesmael.

NOTE ON THE OCCURRENCE OF *LEPISESIA FLAVO-FASCIATA*, BARNSTON.

BY H. H. LYMAN, MONTREAL.

Having been asked by Sir William Dawson to look over two collections of insects which had been sent in in competition for a prize, I was delighted to find in one of them a specimen of this very rare moth.

Knowing that everything in connection with the capture of such a rarity would be of interest, I asked Sir William to ascertain from Mr. R. McDougall, the collector, all the facts that he could furnish in connection with such an interesting event, and I duly received, through Sir William, a letter about it, from which I extract the following account :—

“The moth was caught at Ormstown, Chateauguay County, and was the only one observed during the summer. If I remember aright, it was captured on the wing, about three o'clock one bright sunny afternoon. It was hovering over a garden, where many kinds of flowers were growing side by side. The capture was made, I believe, about the middle of June.”

This species has been taken sparingly at widely separated localities. It was described by Barnston from a specimen taken at St. Martin's Falls, on the Albany River, Hudson's Bay Territory. Grote and Robinson gave its habitat as the Atlantic district. Strecker figured it on Plate XIII., fig. 4, of his “Lepidoptera,” but in nature the yellow of the hind wings is brighter, and with a good deal more orange in it than would be supposed from Strecker's figure. Strecker gave the localities as Canada ; Holyoke, Mass.

Prof. Fernald says of this species :—“The early stages and food plant of this exceedingly rare moth are unknown. It has been taken in Canada, Massachusetts, Belfast and Orono, Maine. Mr. Thaxter informs me that he saw one at Kittery, Maine, flying around the flowers of Larkspur in June. It flies in the middle of the day in the hot sunshine around the flowers of apple, lilac, shad-bush, etc. It appears to be one of our earliest day-flying sphinx moths.”

THE HABITS OF A GROUND-HORNET.

BY WM. T. DAVIS, TOMPKINSVILLE, STATEN ISLAND, N. Y.

Stizus speciosus is the largest native ground-hornet, and its formidable appearance and great activity generally secure it undisputed possession of the square rod where it happens to alight. It is from an inch to an inch and one-half in length; the head and thorax are brown, and the abdomen is black with six irregular yellow blotches. These markings are discernible as it flies swiftly about its business, and give it a particularly tiger-like appearance. It seems to be afraid of nothing, and if you walk near its burrow it flies with a menacing buzz in circles about you, and its brown, black and yellow body gleams in the sunlight.

In constructing its burrows, it usually selects a country roadside or a dry, barren hill, where a freedom from roots makes digging less laborious.

On the hill back of Richmond village, on Staten Island, I have seen them carrying heavy harvest-flies to these burrows, several of which are dug there nearly every summer. The task of carrying so great a burden as a *Cicada* is a particularly laborious one, and they do not fly very fast when thus heavily laden. Sometimes they drag the harvest-flies a distance along the ground, and sometimes they resort to an ingenious method to finally get them to their burrows.

In August, 1889, I observed a *Stizus* carrying a *Cicada*, and flying slowly up a hillside. It lit at the base of a black birch on the hill-top, and dragged the harvest-fly, holding the smooth dorsal surface to the bark, to the topmost branches, finally disappearing among the leaves. I did not see it leave the tree, for I was unable to command a view on all sides at the same time, and then there was a neighboring birch whose branches interlocked with the one where the hornet was. I satisfied myself that it did leave, by climbing up and violently shaking the branches and tree top. *Stizus* employs this method of transporting the heavy *Cicada*; it climbs the tree with the insect, and then flies from the branches, the excessive weight gradually bringing it to the ground again, but nearer to its burrow.

Professor Morse, in his annual address before the American Association in 1887, notices the following:—"Dr. Thomas Meehan describes a hornet that was gifted with great intelligence. He saw this insect struggling with a large locust in unsuccessful attempts to fly away with it. After several fruitless efforts to fly up from the ground with his victim, he

finally dragged it fully thirty feet to a tree, to the top of which he laboriously ascended, still clinging to his burden, and having attained this elevated position he flew off in a horizontal direction with the locust."

Commenting upon this, Mr. C. G. Rockwood, jr., in Science for August 19th, 1887, gives an account of "a large insect evidently of the wasp family," that carried a *Cicada* for a distance of twenty feet up a maple tree and then flew away with it as described above.

Wishing to ascertain the relative weights of these insects, I had dried specimens, including pins, weighed in a druggist's scales. *Cicada tibicen* weighed thirteen grains and *Stizus speciosus* seven and one-half.

LIST OF LEPIDOPTERA TAKEN AT LITTLE METIS (RIMOUSKI CO.), P. QUE.

BY ALBERT F. WINN, MONTREAL.

My collecting at Little Metis having been confined to July and August, my knowledge of the forms occurring there is necessarily very incomplete; but as the insect fauna of the Lower St. Lawrence seems to differ considerably from that of Ontario and the western part of Quebec, I venture to give a list of the species I know to occur there, and hope that in the event of my not going there again, some other entomologist will give us a list of additions.

1. *Papilo turnus* Linn. Common inland; rarer on the shore; July.
2. " *asterias* Fabr. Rare; July; larva in August.
3. *Pieris oleracea* Bd. Very common; July and August.
4. " *rapæ* Linn. Very common; July and August.
5. *Colias philodice* Godt. Very common; July and August; Albino females sometimes as common as yellow ones, though not usually.
6. *Danais archippus* Fabr. Very rare; 1 specimen, August.
7. *Argynnis cybele* Fabr. Females common; July; no ♂'s seen.
8. " *atlantis* Edw. Very common; July and August.
9. " *myrina* Cram. Rare; July (commoner, no doubt, in June.)
10. " *bellona* Fabr. Very rare; July, in a swampy field.

11. *Phyciodes tharos* Drury. Common ; July.
12. *Grapta faunus* Edw. Rare ; August.
13. " *gracilis* G. & R. Common ; August, but hard to catch.
14. " *progne* Cram. Very rare ; 1 specimen, Aug. 18th.
15. " *J-album* Bd. Very rare ; 1 specimen, Aug. 12th.
16. *Vanessa antiopa* Linn. Common ; August ; larvæ on poplar, July.
17. " *Milberti* Godt. Very rare ; 1 specimen, August.
18. *Pyrameis atalanta* Linn. Very rare ; August.
19. " *huntera* Dru. Rather common ; August.
20. " *cardui* Linn. Abundant in 1884 and 1889 ; none seen other years.
21. *Limenitis arthemis* Dru. Local, but common where found ; July.
22. " *disippus* Godt. Rare ; July.
23. *Satyrus alope*, dim *nephele* Kirby. Very rare ; 1 specimen (♂), August, 1884.
24. *Chrysophanus americana* D'Urban. Abundant ; July and August.
25. *Lycæna Couperi* Grt. Very rare ; 2 specimens, July 8th and Aug. 18th.
26. *Pamphila Peckius* Kirby. Common ; July.
27. " *manitoba* Scud. Common ; end of July and August ; very fond of buttercup flowers.

ZYGÆNIDÆ.

28. *Ctenucha virginica* Charp. Local, but abundant in places ; July.

BOMBYCIDÆ.

29. *Deiopeia bella* Linn. Very rare ; 1 specimen, August.
30. *Arctia virgo* Linn. Rather common at light ; July.
31. " *Saundersii* Grt. Common ; July and August ; light.
32. *Spilosoma virginica* Fabr. }
33. *Leucartia acræa* Pack. } Larvæ common in August ; moths,
34. *Halesidota caryæ* Harr. } probably about in June.
35. " *maculata* Harr. }
36. *Orgyia nova* Fitch. Common ; August.
37. " *leucostigma* A. & S. Rare ; August.
38. *Ichthyura albosigma* Fabr. Rare ; July, 1 specimen ; light.
39. *Pheosia rimosa* Pack. Rare ; July ; light.
40. *Clisiocampa americana* Harr. Rare ; July, 1 specimen.
41. *Hepialus 4-guttatus* Pack. Very rare ; August ; light.

NOCTUIDÆ.

42. *Gonophora scripta* Gosse. Rare ; July and August.
43. *Raphia frater* Grt. Rare ; July.
44. *Bryophila lepidula* Grt. Rare ; July and August.
45. *Microcalia fragilis* Guen. Common ; July.
46. *Agrotis baja* S. V. Common ; July.
47. " *C-nigrum* Linn. Common ; August ; light ; treacle, and in fields by day.
48. *Agrotis haruspica* Grt. Very common ; July and August.
49. " *fennica* Tausch. Very common ; July and August.
50. " *subgothica* Haw. Common ; July.
51. " *plecta* Linn. Rare ; July.
52. " *clandestina* Harr. Common ; July and August.
53. " *ypsilon* Rott. Rare ; August.
54. " *occulta* Linn. Rare ; July.
55. *Mamestra lorea* Steph. } Common ; July.
56. " *renigera* Steph. }
57. *Hadena devastatrix* Brace } Common ; July and August ; by light,
58. " *arctica* Bd. } and treacle.
59. " *dubitans* Walk. (?) }
60. " *sputatrix* Grt. }
61. " *verbascoides* (?) Guen. Rare ; 1 specimen, July.
62. " *lignicolor* Guen. Rare ; July.
63. " *impulsa* Guen. Rare ; July and August.
64. " *mactata* Guen. Rare ; July.
65. *Hyppa xylinoides* Guen. Rare ; July.
66. *Trigonophora periculosa* Guen. Rare ; July, 2 specimens.
67. " *V-brunneum* Grt. Common ; July and August.
68. *Euplexia lucipara* Linn. Rare ; July.
69. *Apamea nictitans* Esp. Rare ; August.
70. *Heliophila pallens* Linn. Abundant ; July.
71. " *adonea* Grt. Rare ; July.
72. *Amphipyra tragopogonis* Linn. Rare ; August.
73. *Caradrina multifera* Walk. Rare ; July, 1 specimen.
74. *Orthosia helva* Grt. Abundant ; July and August.
75. *Cucullia intermedia* Spey. Rare ; July, 1 specimen found on a poplar.

76. *Abrostola urentis* Guen. Very rare ; July, 1 specimen.
77. *Plusia æreoides* Grt. Common ; July ; light.
78. " *ærea* Guen. Common ; August.
79. " *mappa* G. & R. Rare ; August ; light.
80. " *bimaculata* Steph. Abundant ; July and August ; light.
81. " *viridisignata* Grt. Common ; August ; day flier.
82. " *brassicæ* Riley. Common ; July ; light.
83. " *ampla* Walk. Rare ; July ; light.
84. " *simplex* Guen. Common ; August ; day flier.
85. *Pyrrhia exprimens* Walk. Common ; August ; light.
86. *Drasteria erectea* Hübn. Common ; July.
87. *Hypena humuli* Harr. Rare ; August, 1 specimen.

GEOMETRIDÆ.

88. *Endropia obtusaria* Hübn. Rare ; July.
89. *Metrocampa perlaria* Guen. Very common ; July and August.
90. *Sicya macularia* Harr. Common ; July ; light.
91. *Amphidasys cognataria* Guen. Rare ; August, 1 specimen.
92. *Deilinia variolaria* Guen. Common ; July ; light.
93. *Semiothisa enotata* Guen. Rare ; July, 1 specimen.
94. *Thamnonoma subcessaria* Walk. Common ; July and August.
95. *Lozogramma defluata* Walk. Common ; July.
96. *Hydria undulata* Linn. Rare ; August.
97. *Rheumaptera hastata* Linn. Common ; July ; by light.
98. " *lacustrata* Pack. Rare ; July ; by light.
99. *Hydriomena trifasciata* Bork. Rare ; August.
100. *Petrophora diversilineata* Hübn. Common ; August.
101. " *hersiliata* Guen. Rare ; July.
102. " *populata* Linn. Common ; July ; by light.
103. " *prunata* Linn. Rare ; July.
104. *Glaucopteryx cæsiata* Bork. Not rare ; July.
105. *Eupithecia* ——— sp. Rare ; 1 specimen, July.

PYRALIDÆ.

106. *Nomophila noctuella* S. V. Very common ; August.
107. *Crambus girardellus* Clem. Rare ; 1 specimen, August.

DESCRIPTIONS OF THE PREPARATORY STAGES OF *SMERINTHUS EXCÆCATUS*, A. & S.

BY WM. BEUTENMÜLLER, NEW YORK.

EGG.—Oval ; pale apple green, smooth, shining ; slightly flattened above and below. Width, 2 mm. ; height, 1.50 mm.

Clemens, in his Synopsis of North American Sphingidæ, p. 182 (Journ. Ac. Nat. Sci., Phil., 1859), describes the egg as being "smooth, white, with an equatorial reddish-brown band, having a slender central white line." All the eggs, about one hundred and fifty in number, which I examined were entirely green, with no indications whatever of the bands mentioned by Clemens.

Duration of this stage, six days.

YOUNG LARVA.—Head rather large, subglobose, dull pale green ; mouth parts pitchy black. Body above and beneath uniformly yellowish-green, with the caudal horn very long and reddish-brown. As the larva advances in age there gradually appears along each side a series of eight lateral oblique yellowish bands, and a subdorsal longitudinal stripe of the same colour. The caudal horn also becomes somewhat brighter, and the head concolorous to the body. Length, 6 mm. Length, when ready to moult, 10 mm. Duration of this stage, about four days.

AFTER FIRST MOULT.—The head is now covered with yellow granulations, and the caudal horn is somewhat longer and more prominent, with a yellow band near the apex. The body has also now some few granulations on the anterior segments. The oblique lateral bands are brighter in colour, and the longitudinal subdorsal stripes are broken by the bands. Length, 13 mm. Duration of this stage, about six days.

AFTER SECOND MOULT.—Little difference from the previous moult, except in shape of the head, which now assumes a triangular form, and the granulations and markings are also somewhat more distinct, and the tips of the thoracic feet reddish-brown, with their bases green. Length, 16 mm. Duration of this stage, about four days.

AFTER THIRD MOULT.—The body in colour now is apple green, and is much stouter. The caudal horn is tipped with reddish-brown at the apex, and is covered with granulations, as is also the body, especially along the dorsal region on the first to the fourth segments. On each side of the head is an oblique band which meet at the vertex. Length, 23 mm. Duration of this stage, about six days.

AFTER FOURTH MOULT.—The body in colour is the same as in the preceding moult, and the caudal horn lacks the reddish-brown colour at the apex. The thoracic feet are now yellow, tipped with reddish-brown, and the abdominal legs have on the outer side of each a small patch of the same colour. The mandibles are pitchy black, and the labrum pink. Length, 34 mm. Duration of this stage, about seven days.

AFTER FIFTH MOULT.—No perceptible difference from the previous moult, except that the elevated granulations which cover the body are more distinct. The thoracic feet are reddish-brown with their bases yellow. Spiracles white with black margins. Length, about 55 mm.

FOOD PLANTS.*—Wisteria, cherry, spiræa, blackberry, apple, rose, plum, elm, oak, hazel, hornbeam, birch, willow and poplar.

The eggs were kindly sent to me from Cotuit, Mass., by Mr. Henry F. Crosby, of New York. Double brooded.

CORRESPONDENCE.

HYBERNIA DEFOLIARIA LINN., IN VANCOUVER ISLAND.

Sir,—In 1887 I took a specimen of *Hybernia defoliaria* at rest on an oak near Victoria. Mr. G. Hulst, who kindly looked over my *Geometra* in 1888, expressed a doubt as to the correctness of the locality, as *defoliaria*, though so common in England, had not been noticed by any American entomologists. Since the first capture I have several times seen larvæ which I am almost certain were of this species, for in the Old Country ten years ago I was familiar with the insect in all its stages. To-day, however (Nov. 18), I have satisfied myself by the capture of two males and one female of typical *defoliaria*. They were all at rest on fences in the City of Victoria, and two or three miles away from the locality where I first observed the species. Possibly this moth is an importation, and, if so, not a very desirable one, as in some parts of England it is considered quite a pest.

GEO. W. TAYLOR.

The specimen mentioned above by Mr. Taylor, as taken in 1887, is now in my collection, and is, I should say, certainly a typical *H. defoliaria*.

J. FLETCHER, Ottawa.

* See Food Plants of Lepidoptera, No. 2, Ent. Am., 1, p. 196.

CHIONOBAS BORE.

Sir,—We have in Colorado a butterfly identical, according to the determination of Dr. Staudinger (see C. E. XVIII., 15), with *Chionobas Bore* Lehn. and Hübner, and by the aid of Mr. David Bruce I have been able the past season to rear the larvæ from egg to adult stage, soon after reaching which hibernation took place. This has led me to inquire into Sandberg's history of *Bore* of Lapland, referred to by Mr. Scudder (Butt. N. E., p. 126), and on writing Dr. Holland on the subject, he very kindly looked up Sandberg's paper, and has sent me a translation of it. So far as I know no translation into English has been published, and I suggest that you print it in full, so that when the history of the American form is published—as it will be after pupation is reached—the habits on the two continents can be compared. It is already clear that our form does not hibernate through two winters. The larval stages began on 16th July, and the fourth (and last) moult was reached 9th September, so that their duration to last moult was but about nine weeks. I hope to see pupæ soon after the winter passes, and shall then fully illustrate the species in "Butterflies of North America."

W. H. EDWARDS.

Sandberg's article is contained in the Berliner Entomologische Zeitschrift, Vol. XXIX., 1885, Part II., pp. 245–265. It is entitled "Beobachtungen ueber Metamorphosen der Arktischen Falter."—*Anglice*. Observations upon the Metamorphoses of Arctic Lepidoptera. I gather from the preliminary pages that the author was for twelve years an official residing in Norwegian Finmark, and that he there made the observations which he records in his paper.

I send you a translation hurriedly made of what he has to say concerning *Oeneis Bore* at p. 247 *et seq* as follows :

1. *Oeneis Bore* Schn.

Egg cylindrical, marble-white, longitudinally ribbed.

Caterpillar clothed with fine hairs, bright brownish-yellow, ornamented by a narrow dark dorsal line, which terminates abruptly, and two broader dark lines, one upon either side. The head is globular, small in proportion to the body, greenish-yellow, with six dark lateral stripes, and black

eyes. The spiracles are of the same colour as the body. The latter is round, tapering posteriorly and with the back arched. The anus is two-pointed. (Zweispitzig.) Length 35 mm.

The caterpillar feeds upon different grasses, and is of an exceedingly sluggish disposition. When disturbed it curls up and remains for a long time without motion. It hibernates twice, and pupates in the month of May in its winter quarters among the roots of grass just below the surface of the ground. It is greatly subject to the attacks of ichneumon-wasps.

The handsomely coloured chrysalis is short and thick, provided with long and broad wing-sheaths, which, as well as the thorax, are of a bright green colour. The abdomen is bright reddish-yellow, with dark spots and a bright green line upon the dorsal aspect, together with a darker line of the same colour upon either side; the spots in the vicinity of the middle line are arranged in pairs upon each segment; the cremaster is short and blunt; the region of the head is adorned on each side by a coal-black, shining streak, which is bent into the form of a half-moon.

The chrysalis, which, as in the case of all Satyrids, is stiff and incapable of motion, and when moved gives no evidence of life, is attacked by parasites of a larger species of ichneumon than attacks the caterpillar. The imago is disclosed after the lapse of from three to six weeks from the date of pupation. The transformations have been hitherto unknown.

This thoroughly Arctic species, which hitherto has not been found south of Lat. 68-69 N., was first detected by Dr. Staudinger upon Norwegian territory in the year 1860, by a pair of specimens coming from Kautokeine in Finmark. Later, in the year 1875, the butterfly was taken by me in numbers upon the sandy meadows near Jacobsely, close to the margin of the Arctic Ocean, in profusion in the interior at Nejden, at Skogerönes ten Kilm, nearer to the sea, and in scattering examples upon the crags at Kirkenes. In Russian Lapland, upon the stretch of country lying between Jacobsely and Kola, this species of butterfly is of very common occurrence. Upon the Norwegian coast, west of Warangerfjord, it has, nevertheless, not been as yet observed.

The caterpillar was found for the first time upon May 15th, 1880.

A single hibernating example, about 10 mm. (about four-tenths of an inch, which would be after second moult), was detected in withered grass upon the barren sand-banks near Jacobsely, and here later in the year a second almost thoroughly matured specimen of the same species was captured. As was to be surmised from the abundance of the butterfly in grassy spots, the larva feeds upon different species of grasses, especially *Festuca ovina*, with which the level reaches about Jacobsely are everywhere overgrown. The theory broached by W. M. Schöyen in his "Oversigt over de i Norges arktiske Region hidtil fundne Lepidoptere, Kristiania, 1879," and which is founded upon the observations made by Prof. C. Berg, of Buenos Ayres, in the case of another species of the genus, viz., *Oen. Gutta* Hb., viz., that the larva feeds upon lichens, has, in consequence, not been established.

The caterpillars which had been collected attained their full development about the end of August, and ceased then to feed, and sank into a lethargic condition. As they gave no evidence of a disposition to pupate, I buried them toward winter, at the end of September, in the ground. On the 15th May of the following year their winter quarters were opened, and one of the caterpillars was found to be dead, the other, on the contrary, appeared to be in a very healthy condition, and crept around lustily without, however, taking any nourishment. Its good health was unfortunately only apparent, for the little creature in a former stage of its larval existence had been stung by an ichneumon-wasp, the larvæ of which were ready to pupate upon May 23rd, and in the end, as they broke through the outer integuments of their host and emerged into freedom, gave the deathblow to the unfortunate victim of misplaced hospitality. These little larvæ transformed speedily, and presently the caterpillar was enveloped by about fifty greyish-white cocoons, which, after the lapse of five weeks in the latter days of June, disclosed the imagines. Thus all the hopes I had built upon these larvæ were brought to an end, and it was not my good fortune until in the spring of the following year, when I again visited Jacobsely, to find fresh specimens. The caterpillars at this time appeared in numbers scattered throughout the grass, so that in the course of a few hours I succeeded in collecting about fifty full-grown examples, among them, unfortunately, not a single example which could be used, inasmuch as they all appeared to have harbored guests during the winter, and were all decorated with from forty-

six to fifty-four parasitic cocoons of the same species as that before observed. Some of the hosts had died during the process, others were still alive; but all further development was at an end in the case of the latter, and at the end of eight days the last one died. Inasmuch as not a single uninjured specimen was to be found among so many caterpillars, I reached the conclusion that the place to look for the chrysalids was under the ground, and that only these caterpillars which were forced by the pressure of the circumstances which I have related, made excursions to the upper world.

The parasitic cocoons which I had collected disclosed the first wasps on the 20th day of June, and pupation, therefore, must have occurred about the middle of May. Their hosts must, therefore, have awakened from their winter's sleep at the beginning of May, and, therefore, their pupation, if everything had progressed favorably, would have taken place probably in the course of the two following weeks. My diligent search for pupæ was for a long while fruitless, until at last on the 25th of May I succeeded in digging up one. It was lying free in the sand concealed under the roots of grass. The transformation had just taken place, as was shown by the skin of the caterpillar, which was quite fresh and still clinging to the anal extremity. The chrysalis on the 24th of June disclosed the butterfly of *Æneis Bore* in a beautiful male example. From four to six days before the butterfly emerged from the chrysalis the wing-sheaths had assumed a dark yellowish-grey, and at last quite bluish-black colour. On the 31st day of May I found still another chrysalis of the same species lying in the grass, but brown in colour. This produced no butterfly, but, upon the 17th and 18th of June following, three specimens of ichneumon-wasps of another much larger species than that which had infested the caterpillar.

In the spring of the year 1883, which, for our high latitudes, was unusually early and warm, this butterfly was observed as early as the middle of June upon the crag at Südwaranger Prestegaarde. At Jacobsely I found on the 15th and 20th of May, under moss in barren spots, concealed among the roots of grass, two caterpillars, which both transformed five days later, and on the 10th and 13th of June following disclosed the imagines (two ♂♂). The duration of the chrysalis stage of existence was, therefore, scarcely three weeks.

W. J. HOLLAND.

BOOK NOTICE.

INSECTA : By Alpheus Hyatt and J. N. Arms. Boston : D. C. Heath & Co.

This handy volume forms the eighth of the series of the "Guides for Science Teaching" issued by these well-known publishers of educational works. The series is intended for the use of teachers who wish to give practical instruction to their classes in Natural History. The volume before us forms a marked advance upon those previously issued, inasmuch as it consists of 300 pages, with over 200 illustrations, while none of the others were more than a fourth of these dimensions. This great enlargement is due, no doubt, to the growing popularity of entomology as a subject for the teaching of observation in schools, as well as for intelligent recreation and serious study on the part of individuals.

The volume before us is an admirable manual for teachers who wish to instruct their pupils in the science of entomology, and will be found most useful also by private students. It is full of admirable diagrams and illustrations, for the most part original, and it takes up for discussion some of the commonest insects in the different orders that can be readily procured by anyone. For instance, the external structure and the internal anatomy of insects are first taught by means of the common Locust (*Caloptenus*), which can be taken in quantities anywhere, a May-fly (*Ephemera*), a Dragon-fly, a Cockroach, a May-beetle, the *Archippus* butterfly, etc., are used to illustrate the different orders. No teacher or student need be at a loss for material with which to follow out the instructions in the book. The whole work is excellent, and we have no doubt that it will be found most valuable in the various agricultural colleges especially, as well as in other educational institutions.

We may quote the following advice from the opening chapter:—"Encourage children to watch living locusts. . . . Better a child should learn to handle one animal, to see and know its structure and how it lives and moves, than to go through the whole animal kingdom with the best text-book, under the best teacher, aided by the best charts ever made. The former would have learned what real knowledge is, and how to get it, while the latter would have simply learned how to pass at his school examination."

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NOTES ON A FEW CANADIAN RHYNCHOPHORA.

BY W. HAGUE HARRINGTON, OTTAWA.

Rhynchites bicolor Fab. has not that general distribution, in Canada at least, that is believed by Mr. Wickham, who remarks (CAN. ENT., Vol. XXII, p. 171): "In fact I doubt if there is a spot on this continent where roses grow that *Rhynchites bicolor* does not inhabit too." On the Pacific coast it is certainly a very common insect, as I found at Victoria, V. I., and New Westminster, B. C., in May and June, 1888. At some points also in the Northwest Territories it is abundant, for my brother sent me many specimens from Moosejaw, Assa. But as we come eastward it seems to disappear. Pettit does not record it in his list of the Coleoptera of Grimsby, nor does Cooper or Provancher give it as occurring in Quebec. It does not appear in any of the catalogues published by the Geological Survey of Canada, nor in that of Hubbard and Schwarz of the Coleoptera of the Lake Superior region, the fauna of which is almost identical with that of Ontario. It certainly can scarcely occur in the vicinity of Ottawa, as both Mr. Fletcher and I have carefully examined our various species of roses for several years and have not observed it.

Rhynchites cyanellus Lec. occurs quite frequently on small willows, sometimes in copulation, and the beetles seem to feed upon the leaves. *R. æratus* Say has only been found once by me, when two specimens were taken upon Bitter Hickory (*Carya amara*).

Attelabus rhois Boh. is the only representative of the family which is found at Ottawa, and is of rare occurrence. The few specimens taken have been on oak and basswood, but I have found upon birch several leaves rolled probably by this species, but from which I did not succeed in rearing the beetles. Provancher gives it as ordinarily found upon hazel, but not common.

Barynotus Schænherri Zett. This species has had a place in American Check Lists on the strength of a specimen received by LeConte from Newfoundland. In August, 1884, I was, however, fortunate enough to

collect at Sydney, Cape Breton, N. S., several beetles which ultimately proved to belong to this species. A short time after I obtained them I sent one to a correspondent in the United States and he named it *Tricolepis alternata* (?). Last winter, in trying to get my Rhyncophora in better shape, I found that some mistake had been made, and after a careful examination of the beetles I decided that they must be *B. Schænherri*, and my finding was at once confirmed by Dr. Hamilton when I sent him a specimen. The beetles were found under logs or drift wood, chiefly near the "ballast heaps," and were well covered with scales, as compared with the one mentioned by LeConte, but not so bright and fresh looking as specimens I have recently obtained from England. I made a hurried search for it in September last in the same locality, but did not find any. The "ballast heaps," I may add, are formed by vessels discharging their ballast of stone, earth, etc., before loading coal, and many species of introduced plants are found on, or about them.

Agasphaerops nigra Horn has been several times recorded, but the specimens appear to have been old rubbed ones. A specimen in my collection from Vancouver Island shows it to be a more striking beetle than the description indicates. The elytra are ornamented with interrupted irregular bands of pearly and golden scales intermixed, and roughly forming humeral and apical lunules. The anterior and lateral margins of the prothorax are also irregularly clothed, and patches occur on the head and ventral surface. The style of ornamentation is similar to that of *Hormorus undulatus* Uhler. which LeConte (classification p. 439) states to be more ornate.

Otiorhynchus sulcatus Fab. was found by me at Sydney in August, 1884, and again in September last. It is apparently quite abundant, as at several points I found fine fresh specimens under boards, etc. Provancher states that this beetle is common in Quebec, and adds, "we think that its larva lives in haws, as we have nearly always found it beneath hawthorns and apple trees."

Otiorhynchus sp. With the preceding species I found at Sydney, both in 1884 and 1890, specimens of a blackish *Otiorhynchus* which has not been identified. It is in all probability a European species, but does not agree with any I have received, and has not been recognized by Dr. Hamilton, or by Dr. Horn, to whom he showed a specimen. It is larger, rougher and blacker than *O. ovatus* Linn, which, curiously, appears to be very rare at Sydney, as I only obtained one specimen.

Strophosomus? This is another species which was found at Sydney in 1884 and 1890 and which does not appear to be uncommon. My specimens were obtained under logs, above high-water mark, and among the grass roots exposed along the sides of the depressions caused by the logs. The species has a marked general resemblance to *Strophosomus coryli* Fab. recorded from New Jersey by Mr. Jülich (Ent. Am., Vol. V., p. 56), but has the legs almost concolorous with the body, and has the head and thorax ungrooved. It is a European species, for in an old case of English beetles which recently came into my possession, I find five specimens of this species placed with three of *S. coryli*, having either been confounded with that species by the maker of the collection, or having lost their label subsequently. I have hitherto considered this beetle an otiorhynchid, not having microscopically examined the mandibles, but it may be more nearly allied to *Strophosomus*.

Aramigus Fulleri Horn appears to be steadily extending its range, and in 1889 one of our city florists suffered a very severe loss from the beetles obtaining a foothold in his rose-house, evidently with imported plants. Not understanding the attack, he had attributed the injury to other causes, and had allowed the beetles to breed, so that in December when I visited the houses both beetles and grubs were abundant. He had then, however, commenced the vigorous application of remedies suggested to him by Mr. Fletcher.

Scythropus elegans Coup. occurs abundantly upon white pine, and varies in colour, as mentioned by Mr. Chittenden (Ent. Am., Vol. VI., p. 168). I have also found it upon spruces, but not frequently.

Podapion gallicola Riley forms numerous galls on the young branches of red pine (*Pinus resinosa*) within a few miles of Ottawa, and Mr. Fletcher, who has visited the lumbering districts, informs me that the galls are very abundant upon the same species in some sections.

Lepyrus geminatus Say is a common species upon willows, but I have not been able to discover the larva. Mr. Wickham, in his Vancouver notes, says "*Lepyrus* is common upon willow," referring to *L. gemellus* Kirby, or *L. colon* Linn., which are both recorded from the West Coast, but probably to the former, as it, or a closely allied species, is apparently common. This genus has a very northerly distribution (through Hudson Bay region, Alaska, etc.), and willows also range far north, so that it is not unlikely that all the species infest these trees.

Listronotus. Of this genus several species occur upon semi-aquatic plants, but it may not be generally known that they appear to be more readily attracted by lights than most rhyncophora. Such I found to be the case one summer, when considerable numbers came to lights placed on a balcony for moths, although the house stood on a hill at some distance from the water (Rideau river).

Pachylobius picivorus Germ. is quoted by Mr. Beutenmuller (CAN. ENT., Vol. XXII., p. 202,) as infesting pine, because in a list of insects found upon that tree (Trans. Ottawa Field Nat. Club, No. 2, p. 33,) I mention *Hylobius stupidus*. The beetles so referred to I have since found to be only somewhat larger specimens of *H. pales*, which were so labelled in the collection of the late Mr. Billings, and probably in other Canadian collections. While speaking of this genus I may mention that I once found a hibernated specimen of *H. confusus* Kirby which had punctured with its beak the tube of a blossom of the Mayflower (*Trailing Arbutus*, *Epigaea repens*) and was apparently feasting on the nectar therein. I do not recollect the date, but snow was still upon the ground in sheltered spots.

Tanysphyrus lemnae Fab. is very abundant during the summer upon Lemna, upon the surface of which hundreds may sometimes be seen crawling. I have also obtained many, by sifting, from moss in which they hibernate, and the specimens so obtained are cleaner than those taken in summer, which are frequently encrusted with mud or slime.

Magdalis. Dr. Hamilton (CAN. ENT., Vol. XVIII., p. 115) separates from *M. Lecontei* Horn a bluish species from Eastern Pennsylvania and Canada. What appears to be this species is common here upon young pines, especially stunted ones growing in stony or poor ground. Specimens vary considerably in the punctuation of the thorax, and some approach the form with canaliculate thorax, which he mentions as found on spruce.

Anthonomus corvulus Lec. is found in profusion upon the flowers of Cornel (*Cornus*) in May, and is readily recognized by its small size, its apion-like form and shining appearance. It varies slightly in size, but not apparently in other respects.

Orchestes. The various species of this genus are found, as recorded, upon willows, especially in spring. *O. pallicornis* Say is always common, and *O. rufipes* sometimes so on trees in moist localities. *O. niger* Horn

was last season as plentiful as *pallicornis*, although seldom taken previously. *O. subhirtus* Horn, and *O. ephippiatus* Say are very rare. I have also one specimen (captured a few miles north of Ottawa on 4th June) of a species which is entirely rufous, except the pectus. It is about the size and form of *pallicornis* and appears to be undescribed.

Acalyptus carpini Hbst., *Elleschus bipunctatus* Linn., and *E. ephippiatus* Say may all be found in profusion on willows, when they are in bloom. The second species varies a good deal in its coloration.

Piazorhinus scutellaris Say is not very rare, but my specimens have been mostly accidental captures by sweeping or sifting. I have, however, found it upon hickory in July.

Miarus hispidulus Lec. has not occurred at Ottawa yet, but is abundant in some parts of Ontario. At London on 15th Oct., 1885, I found the seed capsules of *Lobelia inflata* very extensively attacked by larvæ from which I reared a large number of beetles.

Pseudomus truncatus Lec. By an unfortunate clerical error of a correspondent I was led to record this species as occurring at Ottawa upon butternut. On the appearance of my List of Ottawa Coleoptera (Trans. Ottawa Field-Nat. Club, No. 5, p. 71) this species was questioned by Mr. Schwarz (it occurring only in the Southeastern States), and on examination the species was found to be *Cryptorhynchus parochus* Hbst. (Crotch 9233 instead of 9223). I regret that such a mistake should have been made, especially as Mr. Beutenmuller has quoted the record (CAN. ENT., Vol. XXII., p. 258).

Piazurus oculatus Say is rare here, but I find two specimens labelled as taken upon basswood on 21st July.

Acoptus suturalis Lec. has been found quite abundantly, sometimes in copulation, on hickory stumps about the end of June.

Mononychus vulpeculus Fab. This rotund little beetle can always be found upon the flowers of Iris in spring, busy love-making or puncturing the base of the flower and depositing its eggs. In autumn it can be obtained in any desired number from the pods, few of which are sometimes free from it. Many of the beetles are, however, destroyed by *Pimpla pterelas* Say, which I have bred in large numbers from the infested pods.

Cæliodes nebulosus Lec. occurs abundantly in June upon mixed vegetation near water, but I have not ascertained what plants it especially

frequents. *Ceutorhynchus*, *Pelenomus*, *Cælogaster* and *Rhinoncus* occur under similar conditions, and also in moss obtained from such localities in the fall.

Centrinus rectirostris Lec. may be found in June, in wet localities, upon Club-rush (*Scirpus eriophorum*), and about the middle of the month the beetles are abundant and are often seen in copulation, or depositing their eggs in the lower portions of the stems. The larva is a moderately stoutish white grub about one-quarter of an inch long, with a brownish head, the sutures of which are whitish. The burrow sometimes goes down nearly to the root, and extends upward several inches. The larva generally winters in the upper part of the burrow so as to be safe from the spring flooding of the ground, and about May transforms to the pupa; the time of the change and the duration of this stage being probably largely dependent on the weather. Some years the grubs are extremely abundant and scarcely a stem of the *Scirpus* in some localities is without its occupant. It is very rarely, however, that more than one grub is found in a stem.

Centrinus prolixus Lec. is common some seasons upon sedges and aquatic plants, but the habits of the larvæ are unknown to me.

Sphenophorus pertinax Oliv. lives in the lower portion of the stem of the Cat-tail Flag (*Typha latifolia*), and its larva and that of the moth *Arzama obliquata* often inhabit the same stem.

Stenoscelis brevis Boh. has been taken on oak, as well as on some of the trees named by Mr. Chittenden (Ent. Am., Vol. VI., p. 99), and my observations of its habits fully confirm his statement that it bores only in standing timber denuded of bark.

Cossonini. Two specimens of a small species were obtained at Sydney in 1884 under the bark of a dead spruce. I am informed that Dr. Horn has the same species from Mass., but it is not described. A species of similar size, but belonging to another genus, occurs here, also under the bark of spruce.

Dryocætes affaber Mann. has been observed boring in terminal shoots of the branches of large white pines, and the cones and twigs (the former chiefly) of the red pine are much infested by this species or *septentrionalis* Mann. The attacked cones may be easily recognized by their stunted and shrivelled appearance, they seldom exceed the size of an acorn. Several larvæ may be found in one cone, and the beetles seem to spend the greater part of their time burrowing in the cones, as I kept a lot of

infested cones in a tin box, and the beetles could seldom be found out of their burrows.

Dendroctonus simplex Lec. A very extensive attack of this beetle was observed a few years ago in a grove of large larches about three miles from the city. In August, when I first noted the sickly appearance of the trees, I found that the bark, apparently all over the trees (the tops could not be examined), was riddled and loosened, and thousands of these beetles with larvæ and pupæ were observed. The trees were, of course, killed, but whether the injury was due entirely to this species, or that the trees had been weakened by other causes I cannot say. I could find, however, no other injuries such as to account for the death of so many large and, previously, apparently vigorous trees.

VANESSA CALIFORNICA.

BY W. G. WRIGHT, SAN BERNARDINO, CALIFORNIA.

It is reported from various quarters that *V. Californica* has within a year or two first been observed in British Columbia, where it is now regarded as something new and strange. It has been suggested to me that a few facts about it, as to California and Oregon, would be of interest.

I have observed it in great numbers from near the Canada line in Washington and Idaho almost to Mexico. Doubtless it ranges down into the Mexican State of Lower California, 200 miles or more, to the great mountain of San Pedro Martier, in latitude 30° N., or the same as St. Augustine, Florida. Its range, as to altitude varies according to latitude. In the more northern places it flies from tide water to the tops of the highest mountains, at 14,500 feet. In the warmer regions of South California it becomes "a stranded butterfly," (if, indeed, there be such a thing,) and is seen only on high elevations and the tops of mountains, and never at any season of the year in the valleys.

In South California it is not seen lower down than 3,000 feet above tide, and from that up to and above the tops of the highest mountains. In that region, near the Mexican line, is a mountain 11,900 feet high, as repeatedly indicated by my barometer, and on that high crest I have seen vast numbers of this *Vanessa* flying over. One day in September, 1880, I was there as guide with a party of strangers, and the butterflies were so thick that even the tenderfeet noticed them. The insects came flying up the western sloping side of the crest upon the wings of the trade wind

moving faster than anyone could follow, and upon reaching the crest, instead of dropping rapidly down the precipice on the eastern side, as they might have been expected to do, they kept right on at the same angle of elevation directly up into the air and out of sight, as if they were going to the moon. In coming up the slope they all made directly for the highest peak, and did not drop over the side of the crest, as they might easily have done. No other species was with them. So, on Mt. Hood, in Oregon, *V. California* flies in countless millions. About the great glacier, at an elevation of 7,000 to 9,000 feet, I have seen them in vast numbers flitting about in the lee of the trees or resting on the ground in the warm spots. I never ascended the high peak of Mt. Hood, but the guides, and every one else who had been high up, spoke of the clouds of this one butterfly to be seen upon the peak. Sometimes the remark was made that "they were all flying in one direction."

The larval food plant in California is Manzanita. Doubtless the larvæ feed also on other plants, as must necessarily be the case in a species so widely spread. The butterfly itself is but rarely seen feeding on flowers. It is often seen at water on the sands of little mountain streams, and is oftenest captured in such places, as its flight is so rapid and strong that it is difficult to capture one on the wing. I had often marvelled that it is so seldom seen on flowers, and at length, several years ago, found it in numbers feeding on sap or dampness that envelops the freshly opening young leaves of fir trees, *Abies*. They were so eager and absorbed in lapping up this nectar that I could pick them off with my fingers, or push the cyanide bottle over them without alarming them, and did so capture a number, which is saying a good deal for a butterfly that is so uniformly wild and difficult of approach. From this circumstance, and from other corroborative indications, I judge that the sap of *Abies* is their chief food in the imago state.

This species of butterfly, like *P. Cardui*, is something of a hoodoo: it is of no value itself, it is usually present when you don't want it, and its appearance seems to be the signal for more interesting species to disappear. It is also of quite a quarrelsome disposition, taking delight in dashing at a nice *Argynnid* or other nice thing just as you are about to capture it, and chasing it out of sight. For all these things, and for others, it is no pet of the butterfly man, and if it has recently irrupted into British Columbia the invasion is one that will give the lepidopterists of that country no joy, it is evident.

NEW N. A. MICROLEPIDOPTERA.

BY PROF. C. H. FERNALD, AMHERST, MASS.

Psecadia deliella n. sp.

Expanse of wings, 21 mm. Palpi white, with the outside of the first two joints black. Head white. Antennæ brown, white above basally. Thorax snow white, with two black bands, one across the middle and the other across the scutellum.

Forewings snow white, with a satin lustre and crossed by five more or less interrupted nearly equidistant bluish-black stripes. The first is nearly straight and extends from the costa nearly across the wing; the second crosses at the basal fourth of the wing and is angulated outwardly near the middle of the wing; the third arises from the costa just before the middle, is angulated outwardly at the middle of the wing and ends at the middle of the hinder margin. This stripe is sometimes interrupted near the middle, and is more or less completely connected with a spot outside of it on the upper side of the cell. The fourth stripe starts from the outer fourth of the hinder margin and extends up to the fold where it stops. A little above and outside of this is an elongated oblique spot. The fifth stripe runs from the anal angle up to the end of the cell where it branches, one branch continuing in the same course up to the costa but broken at the point of branching, the other branch extending obliquely up and inward nearly to the costa where there are three or four costal marks of different sizes. Outside of this stripe, on the middle of the wing, are two dashes, not in the same line, but sometimes connected. About nine spots of unequal size, more or less confluent, rest on the outer edge of the wing, three on the costa and the rest on the outer margin. A small black spot rests on the base of the costa. The basal half of the fringe is orange yellow and the outer half smoky-brown.

Hind wings, above and beneath, white basally, pale fuscous apically, fringes white. Underside of forewings dull whitish, with fuscous along the costa and outer border, and faintly showing the marks of the upper side.

Abdomen dark smoky brown, the segments edged with whitish. Anal tuft, and second segment orange yellow. Underside white with a black spot on the middle of the basal part of each segment. Forelegs black with the joints tipped with white, and the fore coxæ are white with a

black stripe on the outside. The middle and hind legs are white and ringed with black.

Habitat, Texas.

Described from one female in my collection, and one male in the collection of Mr. A. Bolter.

I have named this beautiful little insect for Miss Dellie Stebbins, who has ably assisted me for the past three years in my entomological work.

Propexus magnificus n. sp.

Expanse of wings, 40 mm. Head and palpi pale fawn color, the latter as long as the head and thorax and mixed with black scales. Maxillary palpi somewhat lighter. Antennæ white above and ringed with dark; the pectinations are black. Thorax pale fawn coloured with a dorsal white stripe, and the inner edge of the patagiæ is also white.

The forewings are pale fawn coloured and mixed more or less with darker scales, except on the costal region and a stripe along the fold. The costa and hinder border are narrowly edged with white, and the veins are striped with white, the median stripe being much the widest; all are more or less expanded on the outer border. Fringes white and cut with two parallel lines of the ground colour of the wings.

Hind wings and abdomen very pale fuscous. Fringes white. Underside of all the wings pale fuscous, the forewings being the darkest. Underside of the body, and all the legs, pale fawn coloured, the latter marked with white on the inner side.

Described from two males taken at Salida, Colorado, June 11, 1888, and sent to me by the Rev. Geo. D. Hulst, from whom I have received numerous favours.

Schænobius maximellus n. sp.

Expanse of wings, 63 mm. Head, palpi, thorax and forewings dull ochre yellow. The labial palpi and forewings are sprinkled uniformly with dark brown atoms, and the forewings have a brownish shade extending outwardly over the cell, a terminal row of dark brown dots resting one each on the ends of the veins; a row of indistinct brown spots extending from the apex in the direction of the outer third of the hinder margin; a similar spot resting on the median vein near the origin of vein 2, and another at the end of the median vein. Fringes of the same colour as the wing but without the brown sprinkles.

Hind wings, and abdomen above and beneath, very pale yellow and sprinkled with brownish atoms; the former with a terminal row of dark

brown dots, and the latter with irregular fawn coloured patches on the second, third and fourth segments. Underside of all the wings lighter than above and with terminal brown dots. Legs dull ochre yellow and more or less sprinkled with dark atoms.

Described from one female in my collection, taken in Austin, Texas.

DESCRIPTION OF A NEW SPECIES OF *EREBIA*, AND
NOTES ON THE SO-CALLED *CHIONOBAS BORE*
OF COLORADO.

BY W. H. EDWARDS, COALBURGH, WEST VA.

Erebia Ethela.

MALE.—Expands 1.5 inch.

Upper side dark brown; both wings have a common extra-discal band of red-fulvous elongated spots, on primaries six, filling the interspaces from lower branch of subcostal to submedian, the second and third from the top a little longer than the others, these last being equal; at the end of the cell a small fulvous patch. Secondaries have five spots, the fifth being in second median interspace, the upper three equal, sub-oval, the fourth about half the size of the third, and the fifth still smaller; fringes of both wings concolored.

Under side of primaries dark brown along the margins to the continuous fulvous band which replaces the spots of upper side; the cellular patch much diffused; all the wing inside the band obscure fulvous on dark brown ground. Secondaries dull black with a grayish tint; the spots repeated, but in yellow-buff, with scales of fulvous about the edges; inside the cell, and against subcostal nervure a small patch of buff scales, less bright than the spots.

FEMALE.—Same size.

Same colour and similarly marked; underside as in the male.

From two ♂, two ♀, sent me by Professor Edward T. Owen, part of fourteen examples taken by him in the Yellowstone Park, June, 1890. This species is allied to *Epipsodea*, is smaller, and quite otherwise ornamented with fulvous. The change from fulvous on upper side of secondaries to buff is similar to what is sometimes seen in *Erebia Pyrrha* of Europe. Esper's figure of *E. Pharte*, ♂, pl. cxx., fig. 3, represents a species of the same size as both sexes of *Ethela*, and the markings are similar in character, only that on upper side the fulvous

spots of forewing make a continuous band, and are broader than in *Ethela*, and beneath hind wing the spots are red instead of yellow.

Probably *Ethela* is a dweller in Colorado also, as the late Mr. W. S. Foster told of a small *Erebia*, distinct from *Episodesa* and *Callias*, which he had seen an example of in Marshall Pass, and which had red spots on the wings.

At the request of Prof. Owen, I name this species in memory of his daughter, Miss Ethel, who assisted him in the capture of these *Erebias*, and whom he has since unhappily lost.

Professor Owen also took the female of *E. Haydenii*, not before observed. It is in all respects like the male.

After the translation of Sandberg's paper was sent to the CAN. ENT. (see XXIII., 16, Jan., 1891), I received from Dr. Staudinger a letter saying that he was satisfied his determination of the Colorado form of *Chionobas*, in 1886, as identical with Lapland *Bore* was wrong. That he had recently received six perfect examples of this Colorado form, and a very large number of true *Bore* from Norway and Lapland. "I see that this species, even in one locality, offers much variation. With one or two exceptions, all have on the under side of the secondaries the veins white like *Taygete* Hübn., from Labrador. Some are hardly to be distinguished from them, and, therefore, I believe *Taygete* of Labrador a local form of *Bore* Hübn.

"*Crambis* Freyer is described from Labrador specimens, and these also show much variation, and I have some which come so near to some of *Bore* that they are difficult to separate.

"Now as to the Colorado specimens: some varieties of the European *Bore*, without white veins on under side of secondaries, come so near to these (of Colorado) that from one specimen only (as in 1886) I could suppose this to be *Bore*. But as I now have six before me, and no one has the white veins like *Bore*, or only very little white, as sometimes is the case also with *Crambis*, of Labrador, I can only believe this a grayish (instead of brownish) form of *Crambis* Freyer. Also, except in the colour, the underside of the primaries of this Colorado form agrees perfectly with the true *Crambis*." In another letter he says: "I would counsel you to name this, perhaps, *Crambis*, var. *griseous* or otherwise."

I have four *Crambis* from Labrador, 2 ♂, 2 ♀, sent me by the late H. B. Moschler, as *Crambis* Freyer. All are dark brown, of thick

texture of wing, quite opaque. On the underside, the forewing is not distinguishable in colour or marking from *Semidea*; the hind wing is dark—a dusky gray, the band within its bordering lines darker, or brown. It closely resembles *Semidea* of Labrador, as determined by Moschler.

I have under view eleven of the Colorado form in question, 5 ♂, 6 ♀, and have seen several others. All are or were gray-brown above, of slight texture of wing, so transparent that the white labels on the pins are distinctly seen through the wings when viewed vertically. All have the band beneath the hind wings gray-white within, and there is a considerable space outside of and next to the band on either side of pure white, forming a conspicuous feature; the rest of the wing, at base and over extra-discal area, is gray-white. The band has similar outline and breadth to that of *Crambis* of Labrador, with variations in both species, and the band of the Labrador *Semidea* is similar to the other two.

As to the forewing beneath, except that in the Colorado form the colours are paler, that form is closely like *Crambis* and also *Semidea*, both of Labrador and White Mountains, of New Hampshire.

I have eight *Taygete* Hübn. from Labrador and Alaska, and the band is of the same character as in all the other species mentioned, varying in outline, but the veins are white in all the eight, as Dr. Staudinger says *Taygete* should have the veins. Also this species is usually yellow-brown; one Alaskan example is dark brown.

In Dr. Staudinger's view the Colorado form is a permanent variety. It certainly is completely isolated, and for untold ages must have been as much so as to-day. A permanent variety in such case is a species. If it originally branched from the Labrador *Crambis*, and of this we are absolutely ignorant, it has lost all connection; breeds true, and fulfills every requirement of a species. And as a species I regard it. Considering that we owe all our knowledge of it to Mr. David Bruce, who, during the last three years, has taken great pains to investigate its localities and habits, and has obtained eggs whereby I have been able to rear the species to adult larval stage, I cannot do otherwise than name it *Chionobas Brucei*.

Mr. Bean, at Laggan, Alberta, has taken a single specimen of this *Brucei*. Mr. Bruce has taken more than 300, and he tells me the peculiar characteristics which I have enumerated have been found in the whole of them.

FOOD PLANTS OF SOME BOMBYCIDÆ AND NOCTUIDÆ NOT INCLUDED IN H. EDWARDS'S CATALOGUE.

BY ROLAND THAXTER, NEW HAVEN, CONN.

The following brief list of food plants of Bombycidæ and Noctuidæ, not included in the recently issued catalogue of Mr. Henry Edwards, may be of some interest to persons engaged in rearing Lepidoptera. When not otherwise stated the insects have been found and reared, or reared from the eggs by myself, and were mostly collected at Kittery, Maine :—

BOMBYCIDÆ.

Orgyia nova Fitch. *Pinus strobus*

" *definita* Pack. *Quercus*.

Parorgyia basiflava Pack. *Betula*.

Limacodes biguttata Pack. *Carya*.

" *fasciola* H.-S. *Carya*.

" *Y-inversa* Pack. *Carya*.

Packardia geminata Pack. *Carya*.

Ichthyura strigosa Grote. *Populus*.

" *indentata* Pack. *Salix*.

" *vau* Fitch. *Populus*.

Gluphisia trilineata Pack. *Populus*.

Notodonta stragula Grote. *Populus*.

Lophodonta ferruginea Pack. *Betula*.

" *Georgica* H.-S. *Quercus*.

Seiroadonta bilineata Pack. *Quercus*.

Edemasia eximia Grote. *Salix*, *Populus*.

Dasylophia anguina A. & S. *Baptisia*.

" *interna* Pack? *Carya*.

Cælodasys biguttata Pack. (*Schizura ipomeæ* Doubl., Lec., Pack). *Acer*,
Ulmus, *Quercus*, *Betula*, *Vaccinium*, *Ceanothus*.

" *leptinoides* Grote. *Carya*.

Heterocampa obliqua Pack. *Quercus*.

" *guttivitta* Walk. *Quercus*, *Carya*.

" *biundata* Walk. *Carya*.

Cerura aquilonaris Lint. *Populus*.

Prioma bilineata Pack. *Betula*.

- Callosamia angulifera* Walk. Liriodendron.
Artace punctistriga Walk. Diospyros virginiana.
Tolyte laricis Fitch. Pinus, three species.

NOCTUIDÆ.

- Leptina dormitans* Guen. Carya.
Habrosyne scripta Gosse. Lilia.
Audela acronyctoides Walk? Abies balsamea.
Charadra deridens Guen. Ulmus.
Raphia frater Grote. Populus.
Feralia jocosa Guen. Abies canadensis and balsamea.
Apatela vinnula Grote. Ulmus.
 " *occidentalis* G. & R. Pyrus malus.
 " *furcifera* Guen. Prunus serotina.
 " *funeralis* G. & R. Carya.
 " *dactylina* Grote. Salix, Betula, Alnus.
 " *hastulifera* A. & S. Alnus.
 " *persuasa* Harv. Quercus (Chapman).
 " *clarescens* Guen. Rosaceæ (esp. Pyrus malus).
 " *ovata* Gr. Castanea.
 " *dissecta* G. & R. Acer.
 " *sperata* Grote. Rubus.
 " *xyliniformis* Guen. Rubus.
 " *lanceolaria* Grote. Found on Comptonia not feeding. Probably a general feeder like *oblinita*. Figured in Abbott's unpublished drawings on *Gaillardia*.
Harrisimemna trisignata Walk. Diervilla, Ilex verticillata.
Agrotis trabalis Grote? Pinus strobus.
 " *astrecta* Morr. Helianthus.
Oligia versicolor Grote. Pinus strobus. Abies Canadensis.
Homohadena badistriga Grote. Lonicera cult.
Gortyna Harrisii Grote. Heracleum lanatum.
Nonagria subflava Grote. Scirpus.
 " *oblonga* Grote. Typha.
Macronoctua onusta Grote. Iris versicolor.
Euthisanotia timais Cram. Pancratium, Narcissus.
Scolecocampa liburna Geyer. Various species of Corticium Polyporus and other of the larger Basidiomycetons fungi.

- Crocigrapha Normani* Grote. Quercus.
Xylomiges confusa Hübn. Quercus.
Scopelosoma Moffatiana Grote. Hamamelis.
Litoprosopus futilis G. & R. *Sabal palmetto* (Lec., Chapman).
Marasmalus ventilator Grote. Rhus typhina.
 " *histrio* Grote. Rhus.
Deva purpurigera Walk. Thalictrum cornutum.
Plusia Putnami Grote. Poa, Agrostis, etc.
Plusia monodon Grote. Liatris, Helianthus.
Pyrrhia exprimens Walk. Rhus., Robinia.
Catocala relictæ Walk. Betula, Populus.
 " *Briseis* Edw. Salix.
 " *habilis* Gr. Juglans.
Panopoda carneicosta Guen. Quercus.
 " *rufimargo* Hübn. Quercus, Lilia.
Homoptera minerea Guen. Salix.

TEN NEW SPECIES OF ORTHOPTERA FROM NEBRASKA— NOTES ON HABITS, WING VARIATION, ETC.

BY LAWRENCE BRUNER, LINCOLN, NEBRASKA.

A trifle more than two years ago the writer first entertained the idea of preparing a synopsis of the Orthoptera of Nebraska, with the intention of publishing it as a special bulletin from the Agricultural Experiment Station. With that end in view, work was immediately begun; and in the course of a few months the greater portion of the manuscript was ready for the printer. At this time other matters that were considered of more immediate importance came up at the Station, and that of the Orthoptera was laid aside. It has now been lying nearly two years.

As the result of special collecting and study on the order for the past eighteen years within the State, my collection contains 241 species that have been taken within its boundary. Among these there are about two dozen species that appear to be new to the science of entomology. From among these apparently new things, the following are selected for publication at this time:

GRYLLIDÆ.

Cycloptilus borealis n. sp.—Head and pronotum of both sexes, together with the two basal abdominal segments of the female, light mahogany brown above; abdomen dark brown inclining to black on the dorsum which is more or less densely covered with silvery grey scales, giving the insect a grizzled appearance. Tibiæ and apical portion of the femora indistinctly fasciate with brown. Underside and basal portion of the legs pale yellowish.

Moderately robust, fusiform; the middle pair of legs rather small; posterior femora not very much inflated. Anal cerci of the female a little more than half as long as the body, quite stout and somewhat hairy; those of the male shorter and slenderer; those of the female directed backward, those of the male considerably divergent.

Length of body, ♂ and ♀, 7.5-8 mm.; of pronotum, ♂, 2.15 mm.; ♀, 1.85 mm.; of antennæ, ♂ and ♀, about 10 mm.; of hind femora, ♂, 3.5 mm.; ♀, 4 mm.; of anal cerci, ♂, 3 mm.; ♀, 4.1 mm.; of ovipositor, 4 mm.

This active little cricket was first taken by me on the 10th of August, 1888, at Valentine, near the Niobrara river. It was found among dead grass upon sandy soil on a south hill-slope. It was again met with on the margins of the large salt basin west of Lincoln on the 15th of the following month. These latter specimens were under boards lying upon sandy soil. Judging from the fact that all the specimens thus far taken have been found upon sandy soil, it will be safe to call it a frequenter of sand districts, where it may be looked for under boards, loose stones, sticks and loose *debris* of all kinds during daytime.

Two other representatives of the genus have been described from North American localities, *i. e.*, *Cycloptilus squamosus* Scudder, a Texan species, and *Cycl. Americanus* Saussure, a Cuban species.

LOCUSTIDÆ.

Ceuthophilus pallescens n. sp.—This wingless cricket is very similar in appearance to *C. pallidus* Thos., but differs from that species in its markings and in the number and arrangement of the femoral and tibial spines. In size it is similar to *C. maculatus*, than which it is slightly less arched.

A moderately long legged species in which the spines are arranged as follows: Anterior femora with two spines beneath internally; the middle, with about four pairs and an outer apical one; posterior femora with both the inner and outer carinæ of the lower edge very thickly set with minute teeth-like spines, the inner row doubled near the middle. Posterior tibiæ furnished with five spines on each edge, somewhat alternately arranged and with the intermediate spaces filled with teeth-like shorter ones; the lower edge is also supplied with three sub-apical and two apical spines only a little less prominent than those above. Middle and anterior tibiæ with three pairs of spines each on the under side. Antennæ moderately long. Eyes of medium size, pyriform.

General color very pale straw color. The middle and hind thoracic segments, together with the first abdominal, marked above with a narrow transverse black patch each. Through these there is drawn a narrow dorsal line that severs them into lateral halves. Eyes shining black. Spines of legs tipped with brown. In addition to the usual spines this insect is characterized by the presence of numerous smaller, almost microscopical spines that are scattered over the general surface of the femora and tibiæ. These latter are entirely brown.

Length of body, ♀, 19 mm.; of antennæ, 30 mm.; of hind femora, 12.5 mm.; of hind tibiæ, 14 mm.; of ovipositor, 12.25 mm.

Described from one female and one immature male.

Habitat.—Dawes and Sioux counties in northwestern Nebraska. The female specimen was taken in a shallow well 17 miles north of Harrison. The male was found under a timber at the tunnel on the line of the Burlington & Missouri R. R., south of Crawford, in Dawes Co.

Udeopsylla compacta n. sp.—About the size of *Daihinia** *brevipes* Hald., to which it bears a very striking resemblance; but is darker coloured than that insect, and at once distinguishable from it in having the tarsi of anterior and posterior legs four-jointed instead of only three-jointed. The posterior femora of this insect also lack the heavy spines that are so characteristic of the other.

Legs short and heavy, the posterior femora in the male very similar to those of the female, very minutely spined below; the posterior tibiæ not

*The genus *Daihinia* is based on the abnormal number of tarsal joints in the anterior and posterior feet, where there are three instead of four. Haldemann's type was not an unique in that respect. I have fully a dozen specimens all of the typical form,

bowed, strongly spined above and below. Antennæ heavy, about as long as the body.

Length of body, ♂ and ♀, 22 mm.; of antennæ, about 24 mm.; of posterior femora, ♂ and ♀, 12.5-14 mm.; of hind tibiæ, ♂ and ♀, 16 mm.

This hitherto undescribed cricket is a native of the sandy districts of Nebraska, Dakota and Kansas; and like the *Daihinia brevipes* Hald., to which it has been compared, also burrows into the sand. So closely do these two insects resemble each other at a cursory glance that I did not distinguish their difference until about to label them for cabinet specimens. It is to be distinguished from *Udeopsylla robusta* and *nigra* by the greater size of its pronotum, also by its less glossy appearance. In colour it is a pitch-brown above and paler beneath.

There is still another species of these large, wingless "sand crickets" to be occasionally met with here in the West. It is the insect that I have called *Udeopsylla gigantea*.* As that characterization was very brief, the following description is herewith presented:—

Very dark brown, almost black, with an interrupted dorsal line and a few mottlings of a lighter shade. The posterior femora are very heavy and clumsy in the male, reaching more than half their length beyond the extremity of the body, furnished below with a row of nine short strong spines; posterior tibiæ three-sided, more strongly bowed than usual, and furnished above with two rows each of four spines which alternate, and between these smaller ones; the lower side also spined on apical half. Legs of female less inflated and not so strongly spined.

Length of body, ♂, 30 mm.; ♀, 26 mm.; of antennæ, ♂ and ♀, about 30 mm.; of hind femora, ♂, 24.5 mm., ♀, 17 mm.; of hind tibiæ, ♂, 25 mm., ♀, 19 mm.

This insect appears to be much scarcer than either *brevipes*, *robusta*, *nigra* or *compacta*, and is confined in its distribution to a much smaller area. It also burrows in the ground and lives solitary. It has been seen by me but once within the State, viz., in the vicinity of Lincoln, near the large salt basin. It is also to be met with in Kansas and the Indian territory—the pair upon which this description is based having been taken in Kansas.

*Bulletin of the Washburn Laboratory of Natural History, Vol. I., p. 127.

Thus far comparatively little attention has been paid to the conocephalids among the Locustidæ of North America. Especially is this true with reference to the genera *Xiphidium* and *Orchelimum*, both of which are rich in species here in Nebraska as well as in almost every other State of the Union. When I undertook to work over the specimens of these insects in my collection, it was but a very short time before the discovery was made of a number of new things. Some of the most striking of these are now described.

(To be continued.)

NOTES.

PHRAGMATOBIA RUBRICOSA HARRIS.

There is no doubt but that our specimens which go by the above name are referable to the European *P. fuliginosa* Linn.

Prof. Smith has noticed their superficial resemblance* which amounts to identity. I have compared examples from France with a series from New York and I can find no difference in ornamentation. Neither do they differ structurally. The venation is identical.† The genitalia of the male also are the same within the limits of variation of the species, which appear to be wide. In the specimen from Europe examined the supra-anal plate is elongate-triangular, produced to a point, concave below, slightly curved down and bulging a little laterally at the base. The side pieces are very long and narrow, gradually tapering and curved inwards. They are strongly concave on the inside, the sides being almost curved over, with a short, sharp projection above and below at a little more than half their length. Of *rubricosa* three specimens were examined. In two the anal plate was aborted, being represented only by a short, square piece; in the third it was present, of the same shape as in the specimen of *fuliginosa*, but a little narrower. The side pieces also varied. In the first and third specimens their edges were so much incurved that the two points came together and were united in one piece; in the other specimen they were as in *fuliginosa*, perhaps even a little less incurved.

From the above it will be seen that *rubricosa* cannot stand as a distinct species.

HARRISON G. DYAR, New York.

*CAN. ENT., XXII., 120.

†My specimens differ from Prof. Smith's figure on page 235 (fig. 8) in that the second subcostal venule branches off before the fifth, while in the figure the reverse is the case. This is so in both European and American examples.

AELLOPOS TITAN.

Mr. Lyman's interesting note on the occurrence of *Lepisesia flavofasciata* reminded me that the Society has in its possession a very rare moth, *Aellopos titan* Cram., and possibly the only Canadian specimen in the country. It was obtained by the Society with the Pettit collection; and Mr. Pettit told me that a neighbour's boy at Grimsby brought it to him alive one morning in his closed hands, and asked if it was of any use to him. Prof. Fernald, in his "Sphingidæ of New England," says it is unknown to him, but is said to occur rarely in the southern part of New England. Mr. Grote does not mention it in his "Hawk Moths of North America," but gives it in his Check List of 1882 as a N. A. species, and in the CAN. ENT. for July, 1886, speaks of it as belonging to the colony of West Indian moths in Florida, some of which at times invade New England.

For the benefit of any of your readers that may be fortunate in securing a specimen I transcribe Prof. Fernald's description:—

"Expanse of wings, two inches and three-tenths. Dull blackish with a slight olivaceous tinge; discal spot black and scarcely visible; a straight, semi-transparent, whitish band crosses the middle of the forewing, followed by another which is much narrower. A somewhat arcuated, similarly coloured band formed of a double series of semi-vitreous, lunate spots extends from the costa nearly across the wing. The terminal space is paler and has purplish reflections. The underside is dark brownish, and the whitish markings of the upper side are distinctly reproduced. The hind wings are blackish, paler at the base and shaded with yellowish along the costa. Head and thorax above, dull brownish with a slight olivaceous tinge. Abdomen olivaceous, with the third abdominal segment white above; fourth segment with a large dark brownish lateral shade which is much reduced on the fifth, but extends entirely across the sixth. Anal hairs, brown on the sides and olivaceous in the middle."

That description applies well to the specimen before me, with the exception that the straight whitish band does not quite cross the middle of the forewings, terminating before reaching the costa, and the black discal spot is quite distinct. Our specimen is fresh, and in excellent condition, its only defect being the absence of part of the anal tuft on one side.

J. ALSTON MOFFAT, Curator.

LEPISIESIA FLAVO-FASCIATA.

The notice of the capture of *Lepisesia Flavo-fasciata* in Canada reminds me that I had omitted recording its occurrence in Colorado. I have taken it there near South Park, above 10,000 ft. elevation. The larva feeds on *Epilobium* in July and August, and varies from greenish-yellow to brown; when young it has a yellowish caudal horn which it loses when half grown (at third moult?) and it then presents a shining black "button" like that of *Thyreus Abbottii*. When full grown the larva is of a dirty olive brown color, with darker mottlings and fine longitudinal lines. It pupates under leaves without making a cocoon or entering the earth. The moth flies in June in Colorado (but I had one emerge last March from a pupa that had been kept in a cool room all winter). This species is partial to the flowers of a species of *Ribes*, flying swiftly from one bush to another, and appears to have all the habits of the two small species of *Hemaris* that frequent the same locality. The larva of *Alypia Lorquinii* is also abundant on *Epilobium* at the same time, and I was collecting it when I discovered the larva of *L. Flavo-fasciata*.

DAVID BRUCE, Brockport, Monroe Co., N. Y.

SCENT-GLANDS IN THE LARVA OF LIMACODES.

Described from four larvæ found on Liquidambar, Oct. 18. When disturbed the larva has the power of emitting drops of clear liquid from pores along the edges of the back, this liquid having an odour similar to that of crushed Liquidambar leaves. These pores are sixteen in number, situated along the edges of the back, their location being indicated by darker green spots just below the edge; between the seventh and eighth pairs of pores on each side is a white spot, and behind the eighth a white dot.

The back varies from entirely brown, excepting the anterior border, to having the anterior fourth, a median stripe from it, and an irregular spot behind the middle, green. The side is green with more or less brown beneath.

The larva is inverted boat-shaped or casket-shaped, obtusely truncate anteriorly and prolonged into a short tail posteriorly; hump-backed. At the median angle on each upper edge is a prominence on each side, behind which and separated from it by the fifth pair of pores is a smaller

prominence. The prothorax is free from the "casket" and retractile; its spiracle on the posterior border; eight pairs of spiracles are visible on the sides of the "casket." The "subjoint" is situated beneath and is retractile.

W. HAMPTON PATTON, Hartford, Conn.

A CORRECTION.

A curious error occurred in the catalogue of *Arctiidae* in the last volume of the CAN. ENT., pp. 167 and 168. Under *Euchaetes egle* I placed as synonyms *Tanada antica* Wlk., and *Arctia sciurus* Bdv. In some way they have attained specific rank in the paper as it stands. They should be indented as synonyms, without the preceding generic abbreviation.

A similar error occurred under *Hyphantria*, pp. 163-165, where *punctatissima*, *congrua*, *punctata*, *textor* and *candida* all stand as species instead of synonyms as was intended. In both cases the error is apparent if the bibliography is consulted carefully; but I deem it better to call attention to it so that the correction may be made in the volume.

J. B. SMITH.

CORRESPONDENCE.

ARCTIIDÆ OF NORTH AMERICA.

Dear Sir: Kindly insert the following synonymical note. On page 231 of Vol. XXII. Prof. Smith refers to *Halisidota trigona* Grt. I would correct this to read as follows:—

Halisidota specularis Her.-Sch.

1854—H.-S., Saml, neuer oder wenig bek, ausser. Schmett., page 72, fig. 59, *Trichromia*.

trigona Grt.

1879—Grt., No. Am. Ent., 46, *Halisidota*.

1881—Grt., Trans. Kansas Ac. Sci., VII., 64.

Habitat—Colorado, New Mexico, Brazil.

I have compared Mr. Grote's description with Dr. Herrich-Schäfer's figure, and there is no doubt but that the two refer to the same insect.

HARRISON G. DYAR, New York.

BOOK NOTICE.

AMONG THE MOTHS AND BUTTERFLIES: By Julia P. Ballard. G. P. Putnam's Sons, New York, 1890; pp. 237.

This beautiful book is an enlarged and revised edition of "Insect Lives," published 1880, and contains recent studies and many additional illustrations. It treats especially of rearing butterflies, sphinges and moths from the caterpillars, and is based wholly on the personal observations of the author. Without previous knowledge of entomology, Mrs. Ballard found herself attracted by some species of caterpillar, and followed it up to pupa and imago, making original discoveries at every step, and gaining experience day by day, and has become an expert in that line. Many of the species treated of, if their early history is mentioned at all in books, have never been so carefully studied as here; witness the story of the great *Leopard Moth*, the *Bulrush Caterpillar*, the *Monkey-faced Moth*, the *Beechnut Box*, the *Rosy Dryocampa*. Of many others, better known than these, are interesting notes, as *Orgyia leucostigma*, *Deilephila lineata*, *Ceratocampa regalis*. The enthusiasm of the author is contagious, and makes the reader wish that spring would hurry along. I do not know of any book—certainly there is none in America—which has attempted to enter upon the field now taken possession of by Mrs. Ballard. If any good father, or aunt, or cousin, wishes to do a kind turn to an active boy or girl, they could not do better than put this book in the young person's hands,—at the same time a net and collecting apparatus (which our good friend John Akhurst will be happy to furnish), and bid them, when spring comes, search the fields and woods as Mrs. Ballard has done. The difference between eyes and no eyes is wonderful, and occupying the former will keep young people out of mischief, at least giving them something to do and to think of. Once let a boy put his foot over the threshold of this temple of ours and catch a glimpse of the inner mystery, and there will be no idle and wasted hours. And to this end the author of "Moths and Butterflies" has well served her generation. WM. H. EDWARDS.

* * * Subscribers are respectfully reminded that their subscriptions are now due and should be paid forthwith to the Treasurer. The date to which payment has already been made will be found on the address label.

Mailed February 4th.

The Canadian Entomologist.

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No. 3.

REMARKS ON PROF. JOHN B. SMITH'S REVISION OF THE GENUS AGROTIS.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

To the great kindness of Prof. French I owe a copy of the Bulletin of the U. S. National Museum No 38, which contains Prof. Smith's Revision of the North American Species of *Agrotis*. In view of the fact that out of the 252 species reviewed by Prof. Smith, no less than 110 are credited to myself, besides five species "not placed," it might be reasonably supposed that I was interested to receive this publication and that I must regret not having received it before publishing my New Check List.

With regard to the classification of the group it is conducted upon the basis first suggested by myself, *i. e.*, the forms with unarmed fore tibiæ are separated, and other divisions are based upon genitalia and sexual characters. These latter, in my opinion, are not sufficient for generic distinctions in the noctuidæ, and we may thus regard the whole as forming one genus, the more so as the European species are not fully drawn into comparison. Prof. Smith is quite right in saying that I had no idea of the extent of my genus *Carneades*. I only regard as belonging to it species with tuberculated clypeus. At the time of establishing the genus upon *moerens* and *citricolor*, I had no longer the opportunity of comparing my former material. I believe there can only be a question of three genera at the expense of *Agrotis* as considered by modern authorities: one in which the anterior tibiæ are unarmed; one in which the tibiæ are all armed, both of these with smooth clypeus; the third (*Carneades* Grote) in which the front is tuberculate. I do not know that the generic term *Noctua* can be used for any of these divisions, according to the rules of zoological nomenclature, because I believe it was previously used in the Birds. For the characters to be used in separating the groups of *Agrotis*, I refer the student to my paper on the genus in the CANADIAN ENTOMOLOGIST, Vol. XV., p. 51, *et seq.* The type of the genus, as pointed out by me, is assumed by Prof. Smith to be the European *segetum*.

I referred, in my Check List, *Pachnobia* to *Agrotis* (1875), but in deference to European writers have lately left it near *Taeniocampa*.

The synonymy of the species adopted by the author is largely that previously adopted by myself. It must be held in mind that, in those years, material had not largely accumulated, and that my descriptions were often drawn up from single examples. I am not surprised that certain forms should be now found connected which I was warranted in separating at the time. Indeed I have myself expressed the opinion. In, some cases, as *A. janualis*, where it is not done, I think the varietal term should have been kept by Prof. Smith; colour is also a character, and my *var. atropurpurea* of *tessellata* is called a "pure synonym," although based upon a difference in shading which is acknowledged to exist. It is probable that here and there some references have been made which will need correction. Among these is *Agrotis clodiana*, which I think will prove different from *vancouverensis* Grt., while my figure in the Illustrated Essay does not merit, I feel sure, Prof. Smith's criticism upon it. But I may pass over this, as well as other points, to notice a few which should not be passed over. That Mr. Morrison sent me specimens not in accord with his types, I have already stated. To this fact differences in my determinations may in part be due. Mr. Morrison sent me specimens of *Pachnobia carnea* from Mt. Washington labelled *scropulana* "type." I did not know *Wockei*, except from Moeschler's figure (which Prof. Smith says is really *scropulana*), nor did Mr. Morrison. But I had specimens from Mr. Moeschler labelled *Pachnobia carnea* from Labrador which were evidently the same as Mr. Morrison's "types," or so-called types, of *scropulana*. I exhibited the specimens before the American Association as well as the examples of *opipara* Morr. and *islandica* Moesch., which latter were also the same species. I am the first to suggest that *islandica* Moeschl. is not the same as *islandica* Stdgr., and, in consequence, to propose to call the American (Labrador and Mt. Washington) species *opipara* Morr. This view is taken now by Prof. Smith, who has adopted many of my views, but I am brought in by him for an incorrect identification of *islandica* which I never committed. It is I who corrected both Moeschler and Packard for improper identifications of *islandica* as an American species. The identification of these Labrador and Mount Washington species is interesting, as illustrating further the theory advocated in my paper on "The White Mountain Butterfly" of geographical distribution in the North American Lepidoptera. With regard to the erroneous determina-

tion of the European *Dahlia*, I may say that Mr. Morrison himself sent me *phyllophora* determined as *Dahlia* var. of Gueneé, and that I corrected this determination. I may say, to conclude with Mr. Morrison, that sometime after the circumstances which led to our difference transpired, Mr. Morrison wrote me a letter in which he acknowledged that he had misled me on several occasions, for the reason that he imagined I had acted in bad faith to him in sending him (at his request) species to describe, which he thought I knew not to be new. These species *were*, however, really new, and I described them, upon Mr. Morrison's refusal, myself, whereupon Mr. Morrison candidly acknowledged his suspicions, of which he relieved me, and this matter brought our correspondence to a close. With reference to the remarks on page 38, with regard to Mr. Henry Edwards's types of *Agrotis*, I would say that I returned the types of *A. niveivenosa*, *A. pallidicollis* and *A. milleri* to Mr. Edwards, and that I did so at his special request. No other "types" were "borrowed" by me, and all other specimens of *Agrotis* received by me from this source were given to me by Mr. Edwards, as a due return for my general determinations of his material in the family. I relinquished to Mr. Edwards really valuable and veritable "types" of *Aegeriadae* in the exercise of a like courtesy, as Mr. Edwards was studying that group. Mr. Edwards's specimens of Californian *Agrotis* were, however, not "types" until worked over by me, and had little value aside from my work upon them. I gave Prof. Smith also several types of *Noctuidae* and Mr. Neumoegen of *Arctia*. I may here remark that Prof. Smith is fond of citing specimens determined by me which are in various collections and do not belong to my species. In some few cases, as in the *exsertistigma* group, these determinations may well be the result of error on my part. But in by far the greater number of cases I believe that the determinations were not positively made by me, that in all, or nearly all, of them I never compared the specimens with my types or had the opportunity of doing so. Names given by me under a reservation would not unlikely be used by the owner of the specimen without that reservation. I think, when my types come to be examined that *A. orbis* will be shown to be distinct from *cupidissima*, and probably the species described by Prof. Smith under the latter title. But on the whole, and granting all that can be said, and while I am certainly not directly responsible for all the mistakes in the different private collections cited by Prof. Smith, which I have never had the opportunity thoroughly to see, much less to study, it must

be clear to the unprejudiced reader that I have made very few mistakes in a very difficult group, and that I have at least laid down the foundations for its proper study. With regard to Dr. Harvey's "types," the specimens belonged to me, and were described under my personal supervision, correction and direction, and Prof. Smith, in complimenting Dr. Harvey's accuracy, is unwittingly betrayed into complimenting me.

In conclusion I may make some remarks on species of mine "not placed" by Prof. Smith. I am surprised that *A. Fishii* Grt. is not placed, although in the list it is marked by a star. This is a very pretty and distinct Eastern species from the sharp contour of the wings and the peculiarities of the ornamentation of colour. *A. juncta* is a dark species, recalling in colour the commoner blackish-brown *Agrotids*, but with the stigmata fused, recalling the *Hollemani* group. I do not doubt its validity, nor that of *nanalis*, the smallest form known to me and resembling *opaca* in appearance. *Mamestra insulsa* Walk. is, I say, on p. 43 of my essay, an *Agrotis*, evidently allied to *Repentis*. What does Prof. Smith mean by saying (p. 209): "Mr. Grote, whose reference of the species to *Agrotis* has been followed, gives no suggestion as to the species it most resembles or where its allies are to be found"? Again, Prof. Smith calls my *Herilis*, "herelis"; *badinodis*, "badinodes"; *insulsa*, "insula"; in all these cases I do not know why.

Finally, with regard to two species rejected from *Agrotis* by Prof. Smith, I would say that I could not determine the structure of the feet in the type of *niveivenosa* (coll. Hy. Edwards). In my New Check List I draw attention to its resemblance to *Cladocera*. I do not believe it is a *Hadena*, as Prof. Smith classes it. I can well believe that *Alaska* belongs to my genus *Agrotiphila*, which in my New Check List I place in the *Heliothini*. I am pleased that my recently expressed opinion that *A. hospitalis* Grt. is a valid species, distinct from *perconfusa*, is confirmed by Prof. Smith.

On page 92 the author remarks: "Mr. Butler says *augur* is the type of *Graphiphora* Ochs., in which case the application of the name to the *Taniocampa* series by Mr. Grote would be unwarranted." I reply, that I have shown that the term *Graphiphora* is not originally Ochsenheimer's but Hübner's, and that its true type is *Gothica*, Check List, 1876, p. 37. It is, therefore, strictly speaking, to be employed instead of *Taniocampa*. As to the affinities of *Agrotis* with *Taniocampa*

I have elsewhere explained myself. There are several other points in Prof. Smith's paper to which I could reply, or as to which I could express an adverse opinion, but I am so much gratified that a needed revision of the species of *Agrotis* has been accomplished, that my own justification or the vindication of my priority in particular instances, becomes a matter of little moment. Any errors it may contain will no doubt be rectified in the future, and in the meantime we have in it a valuable repository of our knowledge of the North American species of *Agrotis*.

ON THE POSITION OF LIMENITIS PROSERPINA, EDW.

BY W. H. EDWARDS, COALBURGH, WEST VA.

Mr. Scudder, in Butt. N. E., argues at length in favor of considering *Proserpina* as neither more or less than a hybrid between *L. Arthemis* and *L. Ursula* (called *Astyanax**). I differ from him, holding *Proserpina* to be a dimorphic form of *Arthemis*, just as *Papilio Glaucus* is a dimorphic form of *P. Turnus*.

**Astyanax* is one of the resurrected names which I, with many entomologists, hold to be objectionable and not to be adopted to the exclusion of names long in use and familiar, repeatedly treated of and figured in books. In the words of the late B. D. Walsh, one might as well "tell New Yorkers to call their city New Amsterdam, or the English to have their letters addressed to Londinium, because these were the original names." Fabricius, in 1775, named the species *Astyanax*. In 1793 he renamed it *Ursula*, for the following reason: it then stood in the genus *Papilio*, in which also stood another species by name of *Astyanax*. He therefore changed the first of these to *Ursula*, and by this name the species has been known to this day—almost 100 years. It is so figured by Abbott and Smith, 1797, and by Boisduval and Leconte, 1833. That Fabricius was right in changing the name to avoid a duplicate in the same genus is undoubted, and although the second *Astyanax* has since been found to be the female of something else, there is no reason for now disturbing *Ursula*. It was a common practice with the early naturalists, and especially with Linnaeus, to change a name given for another, and the change was accepted by their contemporaries. In some cases we can to-day see the reason; in others we cannot, but that there was a sufficient reason at the time is not to be questioned. There was no "priority rule" at that day. To deny that Linnaeus had the right to change one of his own names if he saw fit is a piece of impertinence. No rule of the kind spoken of was ever adopted till 1842, and that could properly have no retroactive effect. The resurrection of obsolete names has been the greatest possible nuisance during the last 20 years or since the publication of Kirby's Catalogue. Two years after the appearance of this Catalogue in 1872 1st July, as appears by the Trans. Ent. Soc., London, the following circular, addressed to entomologists, was laid before the Society, with signatures of most of the leading British entomologists appended:—'ENTOMOLOGICAL NOMENCLATURE.—The undersigned considering the confusion with which entomological nomenclature is threatened (and from which it is already to no small extent suffering) by the reinstatement of forgotten names to supersede

Now what are the known facts about *Proserpina*?

1. The species *Arthemis*, black, with a broad common band of white across the disks, occupies the whole northern part of the continent, from ocean to ocean, and from the Arctic Circle to northern Massachusetts and westward to Wisconsin.

2. Along the southern border of the range of *Arthemis*, in certain localities only, there flies, and constantly associates with it, a small black form agreeing exactly with it in size and in outline of wings. This form may either be without a white stripe across the disks (*vide* Butt. N. A., 2, pl. 36, fig. 5), or it may present such a stripe corresponding in position

those in universal employment, urge upon entomologists the desirability of ignoring the names so brought forward until such time as the method of dealing with them shall be settled by common agreement.

"(Signed)

H. W. Bates.

Alfred R. Wallace.

Wm. C. Hewitson.

Francis P. Pascoe.

T. Vernon Wollaston.

John A. Power.

Samuel Stevens.

Edward Sheppard.

Ferdinand Grut.

J. W. Dunning.

Frederic Moore.

W. Arnold Lewis.

Frederick Bond.

J. Jenner Weir.

E. Shepherd.

Edw. W. Janson.

Edw. Newman.

E. T. Higgins.

B. F. Logan.

J. Greene

Thos. H. Briggs.

W. C. Boyd.

Howard Vaughan."

And following this: "Professor Westwood stated that . . . he considered a law similar to that which limits adverse claims to real property in this country to a period of twenty years, might with equal advantage be applied in zoology."

Now, since 1872, there has been no "common agreement" by entomologists as "to the method of dealing" with these "forgotten names," and the question stands just where it stood then. Mr. Scudder, apparently, in order to get some show of authority for resurrecting dead names, has followed, he says, "the rules laid down by the American Ornithologists Union"! (What have entomologists to do with the rules of American Ornithologists?) And so he displaces a large proportion of the recognized names in American lepidopterology for dead and forgotten and what is worse, often wholly unauthenticated ones. Thus we get *Danaïs Plexippus* for *D. Archippus* (in his earlier writings he called it *D. Eriippus*). *Limenitis Archippus* for *L. Disippus*, *Papilio Polyxenes* for *P. Asterias*, *Neonympha Eurydice* for *N. Canthus* (absolutely without any right whatever), *N. Phocion* for *N. Areolatus*, *N. Cornelius* for *N. Gemma* (both these unauthenticated), etc., etc., without end. One of the strangest changes of all is that of *Papilio Turnus* into *P. Glaucus*. *Turnus* has been described 119 years, and during the entire period has been known by that name alone. *Glaucus* was described 126 years ago from one sex only. It is not a species at all, it is the black dimorphic female of *Turnus*, and it has no corresponding male. It is scarcely twenty years since this fact was made known. As a dimorphic form it needs a distinguishing name. It is the practice to give such forms names. Mr. Scudder now calls the entire species *Glaucus*, but to get a name for the black female he calls it *Glaucus-Glaucus*! and there is no *Turnus* any more. Is not that a precious device! I advise every lepidopterist to ignore such changes, one and all, and to adhere to the accustomed names, nearly every one of which has a full century of undisputed title.

to the outer edge of the white band of *Arthemis* (as in Butt. N. A., 1, pl. 41, figs. 1, 2). It is rarely or never solid white, of clear colour, as in *Arthemis*, but is slight and often nebulous.

3. South of the territory occupied by *Arthemis* is the black species, *Ursula*, flying to the Gulf of Mexico and at the southwest, in Arizona at least. Over a considerable belt, say perhaps of fifty to one hundred miles width, along the southern range of *Arthemis* and northern range of *Ursula*, many examples have been taken which are undisputed *Ursula*, but have more or less distinct traces of a white stripe similar to that seen in *Proserpina* (Butt. N. A., I, pl. 41, figs. 3, 41, for such an example of *Ursula*), though never so heavy as in the most strongly marked examples of *Proserpina*. South of this belt, so far as I am aware, such striped examples have not been taken. *Ursula* without modification or variation occupies many degrees of latitude, but in the southwest comes to be considerably changed and is lost in its variety *Arizonensis*.

4. I myself obtained eggs from a female *Proserpina* at Stony Clove, in the town of Hunter, in the Catskills, elevation 2,000 feet, and from these eggs raised four pupæ from which came three *Arthemis* and one *Proserpina* (this last is figured in Vol. II. before cited), so establishing the dimorphism. The relationship of the two forms had been suspected but never proved. Mr. Mead relates, CAN. ENT. VII., 162, that he obtained about 500 eggs from fifteen females *Arthemis*, and 31 eggs from a single female *Proserpina* at same time, showing the black female to be as fertile as the pied one.

5. I am thoroughly familiar with this part of the Catskills—in fact was born and bred in the town of Hunter—and for many years collected butterflies there, and I can say positively that I have never seen an example of *Ursula* there. It does not fly at all in that elevated district. On reaching the Valley of the Hudson, ten miles west from Stony Clove, *Ursula* begins to appear. Nowhere is the surface in Hunter at less than 1,700 feet, and all the highest peaks of the range are within the town limits. Between the Clove and the river valley are Round Top, High Peak, etc., and the lowest ground is the summit of the Kaaterskill Clove, elevation nearly 3,000 feet.

6. In preparing the text for *L. Arthemis* for Butt. N. A., I made careful enquiries about *Proserpina* all along the line from Maine to Wisconsin, and published the information gained. This form was rare in Maine, not common in south New Hampshire, unknown in Vermont, as also

in the Adirondacks of New York; common in middle Michigan, and in certain localities in Wisconsin. Had not been seen at Toronto, Canada, but occasionally was noticed at Hamilton. That is, along a line of 1,000 to 1,500 miles on the southern border of the range of *Arthemis*, and the northern border of the range of *Ursula*, at a few spots only had *Proserpina* been observed east of Michigan (to the west there is no definite information). The only region where *Proserpina* was known to be abundant is in the town of Hunter above spoken of. All this appeared from the evidence spread out in the Butt. N. A.; and Mr. Scudder has been able to add nothing to it but this, that in "the Graylock Hopper" (an elevated valley in the mountains) at Williamstown, Mass., *Proserpina* was "tolerably common." As to its abundance at Stony Clove we have the direct testimony of Mr. Mead, who also collected there year after year. Speaking of one year he says:—"When I collected every *Proserpina* I could find I took 110, of *Arthemis* I actually did take about 200 and could have taken 1,000 without any difficulty.

7. In all the preparatory stages *Proserpina* and *Arthemis* are precisely alike, and both are specifically removed from *Ursula*. Witness the figures of the eggs, *Arthemis*, Butt. N. E., pl. 64, fig. 15; *Ursula*, fig. 12. I have Mrs. Peart's drawings of the eggs of both *Proserpina* and *Arthemis*, and they are indistinguishable. In the first two larval stages all this group are alike, but at second moult each species takes on characters of its own. Fig. 26, pl. 74, given by Mr. Scudder as *Arthemis* mature larva is copied from Trouvelot's drawing of *Proserpina* (made for me and loaned for use in the Butt. N. E.). This drawing is named on its card *Proserpina*, and of course, in giving it on his plate as *Arthemis*, Mr. Scudder was satisfied that it answered equally well for either form. I have another drawing of *Arthemis* at the same stage, made by Mrs. Peart, and all its peculiarities are shared by *Proserpina*. These are widely different from the mature stage of *Ursula*, as is plain from Mr. Scudder's figures of the latter, pl. 17, figs. 17, 21. Just so, the pupæ of *Arthemis* and *Proserpina* are alike (I have drawings of both), and differ specifically in form and colour from the pupa of *Ursula*, Butt. N. E., pl. 83, fig. 12, for *Ursula*; fig. 14 for *Arthemis*, copied from Mrs. Peart's drawing of *Proserpina*. So we have, on the one hand, the two co-forms, alike in each and all of the three earlier stages, and alike in size and shape of wings in the imago, (and Mr. Scudder allows this to be the fact, by using the drawings of larva and pupa of the co-forms interchangeably); on the other, *Ursula*, differing distinctly in the three stages,

and nearly always much larger in the imago, with differences in the shape of each wing. (As is well shown in Butt. N. E., pl. 2, *Arthemis* fig. 5, *Ursula* fig. 8.)

8. All the species of *Limenitis*, at the east, have one style of flight, and it is that which Mr. Scudder attributes particularly to *Disippus* (his *Archippus*): p. 277, "the flight is rather leisurely and sailing; it moves irregularly from place to place." Of *Arthemis*, he says, p. 300, it has "a rather short and rapid flight." Perhaps it has sometimes, but usually it has the same leisurely flight as *Disippus*. Of *Ursula*, p. 287: "Its flight is similar to that of *Disippus*, but still more *lofty and grand*, more leisurely and sweeping." *Ursula* is a very common species here at Coalburgh, and I can bear witness that there is nothing lofty or grand about its mode of flight. It darts about from place to place, from the ground to a leaf on tree, from tree to ground, haunts one locality, and once seen may be seen there regularly for days; feeds on excrement on the ground, and lingers about the spots where that is to be found. A sustained flight would be contrary to its observed habits. I should as soon expect an *Apatura* butterfly to fly long distances as a *Limenitis*. The habits of the two are very much alike.

In the argument to prove *Proserpina* to be a hybrid between *Ursula* and *Arthemis*, instead of a dimorphic form only of *Arthemis*, Mr. Scudder says:—" *Proserpina* occurs only in a very narrow belt across the eastern third of the continent, a belt which forms the southern boundary of the range of *Arthemis* and the northern of *Ursula*. It is known at so many points in this belt, *that it presumably occurs wherever Arthemis and Ursula are brought into contact.*" That this is an unwarrantable assumption follows from what I have before stated. "There are but two arguments used to prove the improbability of such a relationship as is here urged: 1. To assert that *Proserpina* has been found where it is probable that *Ursula* does not occur within at least an easy day's flight; a distance of a few miles is of no account whatever." Is it not? Are we to suppose that *Ursula*, male, of the Hudson River Valley, is so seized with a longing for *Arthemis* female, of Stony Clove, as to transform him from a short and leisurely flyer into one "lofty and grand," to whom "the distance of a few miles is of no account whatever," and cause him to desert his own females and scale mountain ranges for other females whom he has never seen nor heard of, and of whom there cannot be a hereditary reminiscence? Or do the *Arthemis* females attract the

males *Ursula* by an emanation after the fashion of the Bombycid females, perceivable ten miles away at the very least? There ought, on any theory of attraction, to be a steady flight of *Ursula* males across the peaks, and once arrived at Stony Clove they should take up their abode there, and be seen in company with these so ardently sought females. But they are not there—never in a single instance have been seen there; and to attribute to them such powers of flight is contrary to what Mr. Scudder is fond of calling the “stupid fact.”

On the other hand, the *Proserpina* males and females live with the *Arthemis*, mate in both sexes with the two sexes of *Arthemis*, and the eggs of one form hatch as readily as do those of the other. The black males mate with black females, and pied males with pied females. Black on both sides will account for the black progeny considered by Mr. Scudder as so close to *Ursula*; and the other mixtures will account for every phase of colour or marking exhibited. Mr. Scudder proceeds: “Several instances of undoubted hybridism are known in the genus.” On which I remark that distinct species of other genera are also known to copulate, and it is not uncommon of *Colias*. And there are instances of species of unrelated genera, even sub-families, copulating. The late W. S. Foster, in 1889, on one of the peaks in Colorado, captured a male *Melitæa Palla* in copulation with a female *Chrysophanus Snow* and they only separated in the cyanide bottle. I have the two mounted by Mr. Foster on one pin, with his label stating the facts attached. Also he notified me of the capture at the time it was made. Mr. Bruce has twice taken pairs of *Lycæna* of which the sexes belonged to different sub-groups in copulation. Such instances go to show that a male, not finding its own female, may seize another, even one wholly unrelated. What fierce passion possesses the males of butterflies may be seen by referring to the history of *Heliconia Charitonia*, Butt. N. A., Vol. II. But when females of a species are abundant, it does not seem very probable that a male will seek the female of another species, much less scale the Catskills to find her!

“*Proserpina* partakes of the characters of the two species mentioned . . . ; it possesses, in fact, just the characters we should expect of a hybrid between these two species. It varies most towards *Ursula* where this prevails, and most towards *Arthemis* where that prevails.” I have answered this in the preceding paragraph. No *Ursula* need to be called in for the solving of this puzzle.

"A careful comparison of a considerable series shows that there is no difference whatever in the genital armour of *Proserpina* and *Ursula*." We should like to have heard whether there is any difference between the armour of *Arthemis* and *Ursula*. The form *Proserpina* is undeniably related to *Arthemis*, only supposably to *Ursula*. If the genitalia, as evidence of specific value, are worth anything, then there should be no differences whatever between *Arthemis* and *Proserpina*. Therefore, if these organs in *Proserpina* are like *Ursula*, as Mr. Scudder tells us, in *Arthemis* they must also be like *Ursula*. But it is implied in the foregoing statement that this is not the case, but that *Arthemis* is unlike both *Proserpina* and *Ursula*. The preparatory stages tell a very different story, and I prefer to believe their testimony rather than that of the other.*

Why any where *Arthemis* has a co-form, or how such form has come to be, is not explainable, any more than why *Papilio Turnus* has a black female as well as a yellow one. The fact is all we know. From the Northern States to the Arctic Circle, in just the territory occupied by

*Are the genitalia valuable in determining species? I doubt it much. We do not need to examine them to prove that two species plainly distinct in the imago are really so as *Papilio Turnus* and *Philenor*. It is when the imagos are puzzling that help from any quarter would be welcomed; as in case of the *Grapta* *C. album*, *Comma*, *Satyrus* and *Faunus*. Will they help us here? Looking at Mr. Scudder's plates, I see that what I consider natural genera, as *Colias*, *Argynnis*, *Limenitis*, etc., have each their own type of these organs. It is not to be supposed that they are cast in moulds like so many iron pots and knowing that every other organ varies, we have the right to believe that the genitalia vary also. How much is the question. In the plates the figures are not drawn to an uniform scale and the organs are differently exposed, probably drawn as they had dried. Some seem to have shrunk in the drying, others perhaps are done from green subjects, and are full and plump. But taking them as they stand: on pl. 33 all these species of *Limenitis* seem to be essentially alike, and I apprehend that the variation between them is no greater than would be found between individuals of each. So the three *Argynnids*, *Atlantis*, *Cybele* and *Aphrodite* are essentially alike. *Grapta Progne* cannot be distinguished from *G. Comma*, though they belong to different sub-groups, while *G. Faunus* differs conspicuously from *Comma*, though these two belong to the same sub-group, and can be but one remove from a common ancestor. On pl. 34 *Phyciodes Tharos* and *Batesii* are alike; and quite a lot of *Thecla*s, together with *Incisalis Niphon* and *Irus*, seem all alike and nowhere specifically different. On pl. 35, the three *Colias*, *Interior*, *Philodice* and *Eurytheme*, are as like as three marrowfats. My friends why are things thus?

If the test is not infallible it is not to be trusted. If it fails anywhere it may fail often. Now, on page 329, under the head of *Grapta Interrogationis*, we read these words: "The two forms (of this species, to wit, *Fabricii* and *Umbrosa*) differ so greatly and so constantly from each other, not only in the colouring but in the form of the wings, and even in the abdominal appendages (the genitalia), that they have been considered distinct species"! That is, if they had not, by breeding from the egg, been proved to be one species by the evidence of the genitalia they would be considered as two! It seems to me this settles at once and for all the value of these organs as tests of species. The study of them may amuse an idle hour, the drawings of them are very pretty, but that they are of any value so far as concerns closely related species does not appear.

Arthemis, the yellow female *Turnus* alone is found. Along the southern boundary the black one appears ; here and there a single individual, and having once got a foothold the black form gradually gains the mastery, and in the south alone rules. There are no yellow females of *Turnus* there.

It seems to me not improbable that *Arthemis*, of all its group, is nearest the parent species. Every character, from egg to imago, shows that all these species are very closely related, and apparently not more than one remove from a common form. *Arthemis* being so dominant, occupying the north, whence most species are supposed to have come, it may even be identical with that form. Having once given rise to a black co-form, this last has gone southward and become modified in shape of imago and color, and in the southwest is itself replaced by its own variety *Arizonensis*.

That two distinct species wherever they come in contact can cross freely, and originate a permanent, intermediate and hybrid race, I do not believe. And, in the present case, the so-called hybrid race is not intermediate, but entirely on the side of one of the supposed parents, to wit, *Arthemis*, and a long way from the other, to wit, *Ursula*. Analogy shows us that it is a case of dimorphism, not hybridism.

TEN NEW SPECIES OF ORTHOPTERA FROM NEBRASKA— NOTES ON HABITS, WING VARIATION, ETC.

BY LAWRENCE BRUNER, LINCOLN, NEBRASKA.

(Continued from page 40.)

Xiphidium modestum, n. sp.—Related to *X. saltans* Scudd. and *X. strictum* Scudd., from both of which species it differs in its smaller size, slenderer form and in colour.

Vertex or cone of the head not quite so broad and shorter than in *saltans*, its closest ally ; pronotum with the sides less bulging, and not reaching as low as in that species. Tegmina very short, only about one-third as long as the abdomen, with the shrilling organ of the male narrower and a little further removed from the base of the wing than in its allies. Posterior femora quite slender, of moderate length. Tip of male abdomen but slightly enlarged, the cerci elongate, tapering, a little curved outward and furnished with a rather long sub-basal tooth. Ovi-

positor about as long as the body, quite slender and tapering, with a gentle upward curve.

Dull testaceous, sometimes with a very faint greenish tinge, the usual markings of the genus deep chocolate-brown and well defined.

Length of body, ♂, 10.5 mm., ♀, 11 mm.; of antennæ, ♂, 30 mm., ♀, 40 mm.; of tegmina, ♂, 3.25 mm., ♀, 2.75 mm.; of hind femora, ♂, 9 mm., ♀, 10 mm.; of ovipositor, 11.75 mm.

This modestly coloured little grasshopper is very plentiful upon uplands throughout eastern and middle Nebraska, where it is to be met with among the short grasses in company with *saltans* and *strictum*. While long-winged forms of both of its near allies are quite common, no specimen of *modestum* has been taken to my knowledge, save of the typical form. This insect also occurs in middle Kansas, Western Iowa and South Dakota.

Xiphidium attenuatum Scudd.—Generally dull testaceous with the usual brown markings of the genus, in some specimens tinged with greenish. Tegmina and wings either abbreviated or fully developed—when the former, about reaching, and when the latter, considerably surpassing the tip of the abdomen in both sexes. Antennæ very long and slender. Ovipositor long, slender, straight or but very gently curved, the apex very acuminate.

Apex between the eyes rather narrow, with the sides abrupt and sharp, the cone but little rounded, not expanding, obliquely docked. Face nearly straight, oblique as in *X. strictum* to which it bears the closest general resemblance. Head and pronotum a little shorter than in that species. Abdomen tapering but slightly posteriorly, with the base of the ovipositor only a trifle enlarged. Posterior femora heavy on their basal two-fifths, slender beyond; the tibiæ also quite slender. Tip of male abdomen a little enlarged, the cerci long, broad and but gently tapering apically, the basal tooth minute, slender.

Length of body, ♂, 12 mm., ♀, 15 mm.; of antennæ, ♂, 55 mm., ♀, 60 mm.; of pronotum, ♂, 2.60 mm., ♀, 3.3 mm.; of tegmina, short form, ♂, 8.5 mm., ♀, 9 mm.; of long form, ♂ and ♀, 19 mm.; of hind femora, ♂, 12 mm., ♀, 14 mm.; of ovipositor, 22–29 mm.

This beautiful species is quite common at West Point, Nebraska, along the lakes and old river beds of the Elkhorn river, where it is found among

a rank grass growing near the water's edge and on very damp meadows. The females insert their slender ovipositors and lay their eggs between the blades and stem. It is very active in its movements, and when disturbed easily eludes pursuit by creeping down among the dense mass of grass.

Xiphidium nigropleurum, n. sp.—In its general structure very similar to the preceding, but with a much shorter ovipositor. Bright transparent green, with eyes, stripe on the occiput and the sides of the abdomen shining black.

This meadow grasshopper is a moderately robust species, with narrow vertex, short occiput, large globular eyes, broad pronotum and strongly veined tegmina which in the male are furnished with a large shrilling organ. The tegmina are usually abbreviated, reaching only four-fifths the length of the abdomen; but an occasional specimen is to be found in which the wings are fully developed and then reach to the extremity of the ovipositor in the females. Ovipositor straight, quite broad and heavy, about as long as the body. Male cerci of medium length, rather stout, tapering gently towards the apex, and with a strong sub-basal tooth. Antennæ long and slender.

General colour bright transparent-green, with the markings on the occiput, pronotum and abdomen bordered with yellowish-white which contrasts strongly with the other colours, which character taken together with the vitreous or glassy appearance of the entire surface, render this insect quite conspicuous among the members of the genus.

Length of body, ♂, 13.5 mm., ♀, 15 mm.; of antennæ about, ♂, 43 mm., ♀, 50 mm.; of pronotum ♂, 3 mm., ♀, 3.6 mm.; of tegmina ♂, 9 mm., ♀, 8 mm., short, 19 mm., long; of hind femora, ♂, 13 mm., ♀, 15 mm.

This beautiful insect, which is our most active species of the genus, is quite plentiful among the rank vegetation on low, moist grounds, and is especially common in wet places where the "cut grass" (*Leesia oryzoides*) grows. The supposition is that this grass offers a better place than usual for the deposition of its eggs which, like those of the "lance-tailed" meadow hopper, are deposited between the leaves and stems of grasses. Grape vines and other creeping plants which form matted clusters that afford shelter from the noonday sun and the bright light of day are

favorite haunts for this and other species of our nocturnal grasshoppers and a few of the arboreal crickets.

The "black-sided grasshopper" is found throughout the eastern half of the State along all of the streams, the banks of which are lined with shrubs and trees. Whether or not it is to be found beyond the region of "forests," I am not prepared to say at present. In a collecting trip taken during the summer and fall of 1888, for the purpose of ascertaining the approximate range of various species of our Nebraska orthoptera, this species was not seen west of Antelope County, on the upper Elkhorn river.

While speaking of the members of the genera *Xiphidium* and *Orchelimum* it might be well to record a few notes relative to their variation in wing-length and habits. Undoubtedly everyone who has had occasion to examine any of our common species of these grasshoppers, has noticed that wing-length was a character not to be relied upon as specific or even varietal difference. A very little examination will at once suffice to show this. So far I have long and short winged specimens of the following species in my collection:—*Xiphidium brevipenne*, *ensiferum*, *saltans*, *strictum*, *lanceolatum* and *nigropleurum*. Of *X fasciatum* I have only long-winged, and of *nemorale* and *ictum* I have only those with short wings. *X. gossypii* is not definitely known to me, and therefore it is not possible for me to venture any remarks upon its wing characters. Many of these insects are quite active fliers and are often attracted after night to bright lights. All of the long-winged forms mentioned above have been taken by me in such locations. That they often fly to great distances is evident, from the fact that both the *lanceolatum* and *nigropleurum*, described in this paper, have been captured at the electric lights in cities at points upwards of a mile from their natural haunts.

The various species of *Orchelimum* also vary somewhat in wing-length; but in no case, so far as I am aware, is the variation so great as in the insects alluded to above. These too are attracted by lights; and it is often the case that the best things are captured here.

Among our grasshoppers of the genus *Orchelimum* I find several forms that do not appear to have been characterized. Of these two of the most interesting will be described.

(To be continued.)

NOTES ON COLEOPTERA—NO. 7.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

Philonthus quediinus Horn. A male specimen of this fine species was taken here. As the anterior marginal puncture of the thorax is placed so unusually far behind the margin, and on a line with the three discal ones, the discal punctures are apparently four. In this specimen the singular bunch of bristles on the penultimate ventral segment consists of about six, all differing in length, and rising from a small median pit resembling somewhat that seen in the male of some species of *Dermestes*. The female was not found, and to distinguish it from those of *palvatus*, var. *rufulus* Fauv., *fusiformis*, *fulvipes* or *occidentalis*, the number of the thoracic punctures, very sparsely and finely punctured elytra, and quediinus like aspect, would chiefly have to be depended on. Previous recorded occurrence: Detroit, Mich.; Kansas.

Xantholinus sanguinipennis Lec. This species is very common and abundant on Brigantine Beach and at Atlantic City under trash from the Bay. It is very easily confused with *X cephalus*, which occurs with it more sparingly and is similarly coloured; the elytra are however of a clearer red without any tendency to become infusate as in the latter; the dorsal and lateral series of punctures of the thorax are more numerous, coarser and constant, being exceedingly fine and some of them often obsolete in the latter. The separation of the upper and lower marginal lines of the thorax in the former species and their union anteriorly in the latter is not a character of easy observation in the hurry of collecting. *Sanguinipennis* will probably be found to be a littoral species. *Cephalus* occurs here, but always under bark, and I can see no difference between these examples and such as are taken under rubbish on the coast.

Canthon laevis Drury. Since Mr. Blanchard's very clear statement of the differences between this and *chalcites* Hald. (Tr. Am. Ent. Soc., XII., 164), it might be supposed these species would seldom be confused; the case is, however, different, probably owing to this exposition not being generally in the hands of collectors, and the great similarity of the more abundant colour forms of both species which renders tradition useless. In northern collections *laevis* is always correctly named. It is distributed from Maine to Mexico and California; in Canada, the New England and Middle States its usual colour is coppery black or brown, but south and west it varies from this to black, blue and green through all shades.

Chalcites seems to be much less common and abundant, being found in the Southern States north to Virginia, and westward to Texas, Missouri, Illinois, Nebraska and Kansas. Its colour is usually coppery, like the bronze form of *lævis*, which seems to be confounded with it by some of the western collectors, and sent as that species to their correspondents, while the name *lævis* is applied to all individuals otherwise coloured. This at least is my experience. However close the species may approach in colour and sculpture they may be infallibly separated by the smooth or granulated pygidium; that of *lævis* being always more or less granulated, and that of *chalcites* entirely smooth and without polish.

Aphodius explanatus Lec. The species was described by Dr. Leconte from a female unique taken in Colorado, which was redescribed by Dr. Horn in his monograph of the family. I am indebted to Mr. T. D. A. Cockerell for a male example taken by him in Custer Co., Colo., and note the following differences. The head is trituberculate with small but well developed tubercles, and with the side margins indistinctly rufous; the thorax has the side margins rufous till near base, which is not rufous, with the medial impressed line exceedingly fine and nearly reaching the apex; the first joint of the hind tarsus is equal to the two succeeding: the club of the antennæ is not darker than the stem, otherwise the descriptions of the female apply. The mesosternal carina is quite fine, and can be best seen when viewed transversely just in front of the coxæ.

Aphodius leopardus Horn. This species is taken at Sudbury, Ontario, by Mr. John D. Evans. Heretofore recorded as occurring in eastern Canada, Maine and New Hampshire. *Pomphoxæ Sayi* Lec. was likewise taken at Sudbury.

Microclytus gazellula Hald., *Clytus gazelluta* Hald., Trans. Am. Phil. Soc., X., 1847, p. 42; changed by Haldeman to *C. gazellula*, Proc. Am. Phil. Soc., IV., 372 (not P. Acad. Phil.); *Clytus gibbulus* Lec. Agassiz, Lake Superior, 1850, 234; *Cyrtophorus niger* Lec. Jour. Acad. Nat. Sci., Series 2, II., 29, March, 1850; *Microclytus* (genus created by Dr. Leconte), Smith, Misc. Collec., 1873, XI., 320; *Cyrtophorus gibbulus* Lec. († *niger* Lec) = *microclytus gazellula* Hald. CANAD. ENT., XVI., 1884, p. 148 (Leconte and Horn).

Though not intended so by the describers, these names may be regarded as representing the colour variations that occur in this species: *gazellula*, pale-brown individuals; *gibbulus*, such as have the anterior half of the elytra ferruginous—the posterior piceous; and *niger*, such as

are entirely or nearly piceous, except the legs and antennæ. Haldeman's description is so bad that it took Drs. Leconte and Horn more than thirty years to find out that *gibbulus* was synonymous. *Gibbulus* is fairly described; *niger* could not well be known had not the describer himself made the synonymy. It would appear from the Jour. Acad., l. c., that he intended to cite *gibbulus* from Agassiz, Lake Sup., but by a slip of the memory wrote *niger*, hence the († *niger*) cited above which seems a rather doubtful use of the error mark. But in writing the description he evidently had a different coloured example before him than that from which he described *gibbulus*. This species, though distributed from the Lake Superior Region and Canada southward to Virginia is not commonly taken, though it might be were its habits more generally known. Its biological record, so far as I know, is as follows: Mr. Blanchard dug a specimen from the bark of a living white oak quite late in October, CAN. ENT., VII., 97. Messrs. Reinecke and Zesch dug four specimens from bark on oak trees, May 6th, 1883, Bul. Brook. Ent. Soc., VI., 36, and remark their longevity. Mr. Harrington took at Ottawa, Canada, three examples on hickory and on sumac flowers in July, CAN. ENT., XVI., 73.

To this record I may add that I took here a male on plum blossoms about the first of April.

Prof. Jerome Schmitt, of St. Vincent College, Westmoreland Co., Pa., took six females early in the season (a set of which, through his kindness, now grace my collection), a history of which I am permitted to publish, which I think best to do in his own words: "They were crawling when observed on a smooth place on a living oak, elsewhere covered with rough, thick bark. Unlike most Cerambycids it is very slow and staid in its movements, and difficult to see because of its resembling the bark very much by its colours and its persistent hiding in the galleries of the bark made by some larvæ, or abandoned by a small myrmecid—*Leptothorax longispinosus*." Prof. Schmitt also writes of having seen this species several years previously on a green oak trunk under similar circumstances, and thinks it very probably breeds in the rough bark. These examples and that taken by myself were of the *niger* colour. Mr. Reinecke has sent me a female and male *gibbulus* which so resembles the common form of *Cyrtophorus verrucosus* as to require a close look to distinguish.

The above records appear to warrant these deductions:—

1st. The species breeds in the rough bark of oak.

2nd. Some individuals develop before winter, hibernating as beetles without leaving the bark, coming forth in early spring ; others hibernate as pupæ or larvæ, changing to beetles later in the season.

3rd. That the beetles may be obtained from October to June by judiciously chopping the bark.

The characters separating *Cyrtophorus* and *Microclytus* were originally feeble, and have recently become more so by some one (the record has escaped me) discovering that the relative length of the antennal joints in the male of the latter are the same as in the former, thus leaving in the males only the presence or absence of a small spine at the end of the third joint of the antennæ as diagnostic. This discovery was made subsequent to Mr. Leng's synopsis of this genus in *Entomol. Americana*, III., 23.

Anthophilax malachiticus Hald. This species occurs here rarely, and my specimens, male and female, I owe to the kindness of Professor Schmitt, of St Vincent, who takes it on chestnut blossoms. The male and female differ in form and perhaps in colour, though the scarcity of examples renders this uncertain. The male is the more elongate, with elytra suddenly narrowed behind the prominent humeri, then scarcely perceptibly so to near tip, which is rounded. In the example before me the head and thorax are bright coppery bronze, the elytra lustrous dark greenish, the underside greenish and bluish black, the legs are rufous with the knees, tibiæ and tarsi more or less infusate. The female is broader, the elytra not so much narrowed behind the humeri and nearly parallel behind the constriction ; the head, thorax and elytra are "splendent green"; the underside is darker and obscured by the vestiture, the legs are coloured as in the male ; both sexes have the last ventral segment broadly rounded, and the head, thorax and underside clothed with fine, soft, whitish hairs, longer and sparser on the thorax. The male belonging to *malachiticus* has not, so far as I know, been described, and the above from only the single individual before me is not likely to apply to all others. A series from different parts of the country, from what occurs in other similarly coloured species, may be expected to yield specimens in both sexes varying from coppery bronze to green, blue or violet, and with legs from black to rufous. *Stenura cyanea* Hald. from Lake Superior seems to be only a greenish blue example, and *A. viridis* Lec. from the same region with the legs black, though the base of the tibiæ is rufous, merely a colour variation. These

forms are likely to be eventually united. Prof. Schmitt has likewise examples of *A. viridis* and of *A. attenuatus* Hald. taken in Elk Co., Pa. *A. malachiticus* is reported to be taken in this vicinity by an amateur, who keeps the locality secret, but I have seen none of his insects.

O. Psenocerus (Clytus) Supernotatus Say, Lec. Ed. II., 200; *pini* ‡ Lec., Jour. Acad. Nat. Sci. Phil., Ser. 2, II., 158. On a former occasion (CAN. ENT. XVI., 36) mention was made of having taken three examples of this species hibernating in the folds of a *Cecropia* cocoon. December 9th I found a good sized nest of a yellowish paper wasp in a clump of briar bushes, from which I took five of these beetles while examining its structure; they were stowed away quite snugly between the overlapping layers of paper and doubtlessly would have passed the winter in comparative comfort. Hibernation, while perhaps an exceptional habit of this species, would seem to be of not infrequent occurrence. The beetle is found on currant, gooseberry, wild and cultivated; wild grape, Virginia creeper, etc., abundantly from June onward; the larvæ live in the diseased or dead limbs of these and hibernate in various stages of their growth, developing during the summer. Mr. A. Fitch named it the "currant borer" and gave a detailed account of it in Rep. III., 98-105, but I have observed no mention of it recently by economic entomologists.

Chromatia (Cistela) Amœna Say. This species was described by Mr. Say from specimens taken west of the Mississippi, and appears to be rare. An insect assigned to this name, occurs sparingly along the western slope of the Alleghanies from Virginia to New York and Canada, though it is scarcely recognizable by Say's description, which must have been made from very differently coloured specimens with the head and palpi, the elytra and feet, black—the rest sanguineous. The eastern examples have the head piceous black with the clypeus and mouth parts rufous, except the last joint of maxillary palpus, black; thorax and all the under side rufous; elytra brownish or piceous black, with the suture and first interval, epipleura, margin and external interval, rufous. As stated by Say, the striæ are closely, minutely punctured and the intervals finely transversely rugose.

This species I have through the kindness of Prof. Schmitt, who takes many good things at St. Vincent, rarely occurring here, though distant less than 40 miles. He allows me to say that he took in July large numbers of *Pltomophagus parasitus* from an ant's nest he was investigating, and in which at the depth of two and a-half feet he found a chipmunk's

nest under a root stored with grain and swarming with a small beetle like *Typhæa fumata*, but which on examination proves to be a species of *Cryptophagus*, probably undescribed. To his industry in this direction is due the honor of the discovery of a strange blind *Pselaphide* beetle living with ants (*Amphyopone pallipes*), recently described by Dr. E. Brendel under the name *Amphyoponica*, and for which he has created the genus *Anops*, Bull. Lab. Nat. Hist. St. Univers., Iowa II., 80.

Micracis suturalis and *aculeata* Lec. These species were bred together from hickory limbs deadened two years—the latter in great abundance, the former sparingly. I was unable to ascertain whether the larvæ live under the bark in the sap wood, or bore more deeply from the first. I could discover no galleries other than of *Chramesus icoriæ*. The beetles came forth from the middle of May till the first of July. The species resemble each other greatly, and while extremes may be readily separated by the difference in the striation of the elytra and pubescence, yet individuals meet closely and are liable to be confounded. In general, *Suturalis* is the more slender and elongated, has the elytra smoother, less deeply striate and the pubescence more visible towards the apex,—sometimes wanting, sometimes extending forward nearly as in *aculeata* in which the hairs are claviform. They are about the same lengths, .10 inch, though the latter being thicker appears the shorter. In both the basal joint of the antennæ is flattened, triangular, and in the male the anterior margin and apex have a dense fringe of very long, pale yellowish hair of peculiar structure. Each hair seems to have a central rachis from which springs rows of long spiculæ which project forward, each of which in turn becomes the rachis of smaller spiculæ. These hairs when viewed under the low powers of a microscope are beautiful objects, appearing as if composed of glass; each basal joint has from 25 to 40 as near as can be counted. When at rest the edge of the joint bearing them projects in front giving the insect a formidable appearance. Were *aculeata* with these strange appendages and clavate bristles magnified to the size of an ox, it would be difficult to delineate an animal of more ferocious aspect. Inhabiting, as they seem to do, the smaller limbs of dead trees, in an economic sense they can scarcely be classed as injurious.

The observed records of distribution are few, owing most probably not to a scarcity of the insects, so much, as to their being neglected by collectors, like many of the other species of *Scolytidæ*.

Suturalis is recorded from Illinois (boring in xanthoxylon twigs), Michigan, Kansas, Louisiana. *Aculeata*, from Virginia, Buffalo, N.Y.

NOTES.

CANADIAN RHYNCHOPHORA.

In reference to Mr. Harrington's remarks on *Rhynchites bicolor*, I may say that it has been taken at Hamilton regularly for quite a number of years, never very plentiful but not considered rare. I always obtained my specimens when beating second growth oak and hickory. There are wild rose bushes in that locality, but I do not remember ever beating a rose bush; if I had known enough I might have found it more abundantly. Of *Attelabus rhois* I took two specimens once in the neighborhood of Hamilton; but on a visit to Brant, between the 13th and 30th of July, 1883, I took it in quantities. There was a neglected field of about five acres, overgrown with hazel, alongside of a bit of woods, and there at that time was to be seen in surprising profusion a great variety of choice Chrysomelidæ and weevils. I had got my previous specimens named by Mr. Reineke, of Buffalo, who gave me the impression that it was rare and valuable for exchange, so I took a lot with the result that even now there are about three dozen of them yet in reserve. J. ALSTON MOFFAT.

APHIDIVOROUS HABITS OF FENISECA TARQUINIUS (FABR.) GROTE.

The observation of Mr. Th. Pergande in the fall of 1885, as recorded by Prof. C. V. Riley in *Am. Nat.*, June, 1886, p. 557, is the earliest published account of a carnivorous habit in a butterfly larva, that of *Feniseca Tarquinius* (Fabr.) Grote.

Some observations made by me a number of years earlier on this insect may yet be of interest, as I distinctly saw these larvæ eating the plant lice upon alder in the autumn of 1869, and bred the butterfly the succeeding May, and was thus the first to discover the apidivorous habit in a butterfly caterpillar. A number of the larvæ were concealed among the woolly herds of plant lice on the stem of an alder near the ground, being completely enveloped in the filaments of the waxy "wool" they might easily have been mistaken for some large Coccinellid. Within a few days they changed to chrysalids of a *Lycænid* type, from which emerged, on the 14th of May following, this rare butterfly.

In this observation is found a probable explanation of Abbott's description of the larva of this butterfly, as given by Mr. Scudder in the *CAN. ENT.*, May, 1872, Vol. IV., p. 85: "Feeds on Indian Arrow-wood and alder; it is partly covered with a white loose down." That the larva

is hairy is almost certain, but what the "white loose down" can be, unless the waxen wool of the plant-louse,* is difficult to determine.

In Psyche, Vol. IV., p. 75, August, 1883, Prof. J. A. Lintner records the capture of *F. Tarquinius* on May 25, 1878, by Mr. O. von Meske, and mentions this as indicating *two* broods of this species, the second appearing in August. My rearing the butterfly proves this to be the case, and shows that the insect hibernates in the chrysalis. The tropical butterfly, *Characias*, has, I believe, been found to be carnivorous.

W. HAMPTON PATTON, Hartford, Conn.

A CORRECTION.

The larvæ described by me in Vol. VI., page 209, of *Entomologica Americana*, are *Heterocampa biundata* Walk. and not *Heterocampa subrotata* Harvey as there designated. I have discovered this error on a recent visit to Dr. Packard, where I had the opportunity of comparing the moths with a specimen that Dr. Packard had compared with Walker's types in the British Museum. I was unable to get this correction into *Ent. Amer.*, as the publication of that periodical has ceased.

HARRISON G. DYAR.

BOOK NOTICE.

BIBLIOGRAPHICAL CATALOGUE OF THE DESCRIBED TRANSFORMATIONS OF NORTH AMERICAN LEPIDOPTERA; being Bulletin No. 35 of the United States National Museum, by Henry Edwards, 1889.

This work, issued by the Smithsonian Institution, is one of very great value to the working lepidopterists of North America, and truly supplies a long felt want. Mr. Edwards, who has devoted so much time to the compilation of this work, is entitled to the warmest gratitude of his brother entomologists for his public-spirited labours in this connection. The work extends to 147 pages octavo, and comprises a table of the number of species in each family, of which descriptions of earlier stages are recorded in this catalogue, a list of the principal authors and publications quoted, the body of the catalogue extending from page 9 to page 137 inclusive; an appendix giving references to a few species which are not distinguishable by modern authors, and a list of some of the most valuable papers which have been published on this continent on the

* *Pemphigus tessellatus* (Fitch).

P. tessellata Osborn, CAN. ENT., XIV., 61, (Apr., 1882).

? *P. alni* Provancher, Nat. Can., Apr., 1890.

subject of preparatory stages, food plants, rearing and describing larvæ, etc., etc. Then follows an index to genera, and the work ends with a most useful food habit index. The general plan of the work is to give the names of all species of which any of the preparatory stages have been described, followed by the references to these descriptions in the order in which they were published, the dates of publication being given. Upon turning to any species one can thus see at a glance just what of its earlier stages have been described, and by looking up the references can tell whether or not they could be supplemented with advantage, while the absence of any species from the list is a very sure indication that its preparatory stages are wholly undescribed. One can thus see just what has already been done and what remains for investigation, and this is most important, for it is undoubtedly the case that many observations of interest and value are made every year without being published, chiefly, perhaps, because those who make them are unaware that they have not previously been given to the world. The amount of literature examined in the preparation of this work was very great, and the care necessary to avoid errors and omissions proportionate. The table on page 7 shows that some part of the earlier stages of 1069 butterflies and moths have been described, but many of these descriptions are very incomplete, and we can thus see how much still remains to be done in working out these life histories. Of course in a work of this kind, where the field was so large, it was inevitable that some mistakes and omissions should occur, but it is most creditable to Mr. Edwards that they should be so few and so unimportant. It was unfortunate that the printing had to be done during the absence of Mr. Edwards in Australia, as otherwise most of the typographical errors would unquestionably have been detected and corrected. It is, however, a mistake to refer to author's separates, instead of to the work in which the description originally appeared, as for example in regard to the larva of *Chionobas Macounii*—the reference given is "J. Fletcher, a trip to Nepigon, p. 12," whereas it ought to be, "J. Fletcher, Rep. Ent. Soc., Ont., 1888, p. 85." It is greatly to be hoped that Mr. Edwards will be able to fulfil his promise to issue yearly supplements, in order that the work may be kept up to date and its usefulness be thus maintained. The price of this work was fifty cents, but the first edition has already been exhausted. It is greatly to be hoped that a new edition will soon be issued, as no working lepidopterist can get on without it.

H. H. LYMAN.

Mailed March 3rd.

The Canadian Entomologist.

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LONDON, APRIL, 1891.

No. 4.

MEETINGS OF THE MONTREAL BRANCH OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

Jan. 13, 1891.—The 159th meeting of the Branch was held at 74 McTavish street, Mr. H. H. Lyman, President, in the chair. Mr. J. F. Hausen read a "Description of a New Species of the Coleopterous Genus *Pterostichus*," which he has named *Pterostichus conspicuipes*, on account of its bright yellow legs. The type was taken at Lachine. Mr. Hausen also read a note "On the Occurrence of *Gracilia minuta*, Fab., at Montreal."

Feb. 10, 1891.—The 160th meeting of the Branch was held at 74 McTavish street, Mr. H. H. Lyman, President, in the chair. There was a good attendance of members, and Mr. James Fletcher, Dominion Entomologist and Vice-President of the parent society, was also present.

Mr. Lyman read "A Preliminary Paper on the Genus *Chionobas*," in which the different species and reputed species inhabiting this continent and the north of Europe were compared, and attention drawn to the wide difference of opinion among entomologists as to the distinctness of the various forms. The paper was illustrated by a large number of specimens from the collections of Messrs. Lyman, Fletcher and Winn, the following forms being represented:—*Gigas*, *Californica*, *Nevadensis*?, *Macounii*, *Chryxus*, *Aello*, *Varuna*, *Uhleri*, *Tarpeia*, *Bore vera*, *Taygete*, *Jutta*, *Oeno*, *Semidea*, *Brucei*, *Crambis*, *Subhyalina*?, from Hudson's Straits; *Semidea var.?*, from Colorado; and *Semidea var.?*, from Laggan.

A discussion followed, after which Mr. Caulfield read a paper entitled "Notes on the Gryllidæ—Field Crickets," illustrated by specimens. Mr. Hausen read a "Preliminary Notice of Three New Species of *Pterostichus*—Systematic Notes." The species are to be called *Pulvinatus*, *Stenopus* and *Strictus*. The types were taken in the vicinity of Montreal. This paper is to be published in the Canadian Record of Science, with a plate and synoptic table of species. After spending some time examining some

specimens of very interesting species of Lepidoptera, exhibited by Messrs. Fletcher and Lyman, the meeting adjourned.

March 11, 1891.—The 161st meeting of the Branch was held at 74 McTavish St., Mr. H. H. Lyman, President, in the chair. There was a fair attendance of members, and the Rev. T. W. Fyles, of South Quebec, was also present. Mr. Winn read an interesting paper entitled "Notes on Some Methods of Collecting Insects," giving his experience in this connection and in the breeding of larvæ. Mr. Lyman read a "Report on a Collection of Lepidoptera from the North of Lake Huron," made by Dr. Robert Bell, F. R. S. C., Assistant Director of the Geological Survey. The collection contained fifty-four species, and the report will be published in the Annual Report of the Geological Survey. Mr. Hausen exhibited the proofs of his forthcoming plate in the Canadian Record of Science, and a number of interesting specimens were exhibited by the members.

A. F. WINN, Secretary.

TEN NEW SPECIES OF ORTHOPTERA FROM NEBRASKA— NOTES ON HABITS, WING VARIATION, ETC.

BY LAWRENCE BRUNER, LINCOLN, NEBRASKA.

(Continued from page 59.)

Orchelimum gracile, n sp.—A slenderer and somewhat smaller insect than either *O. vulgare* or *O. concinnum*, from both of which it differs in the form of its pronotum and of the ovipositor. The tubercle of the vertex is short, broad, and has the apex rounded. The tegmina and wings are of moderate length, very delicate in texture, and in the male furnished with an inconspicuous musical apparatus very similar in proportions to that of *agile* and *longipennis*. Legs slender, the posterior femora not quite reaching the tips of the closed tegmina. Terminal segment of the male abdomen quite broad; the anal cerci stout and acuminate, with the internal tooth minute; subgenital plate broad and long, reaching beyond the tips of the cerci. The ovipositor unusually long, broad, nearly straight and fine pointed.

In colour it is pale transparent-green with a broad reddish-brown band upon the head and pronotum, continuous from the tip of the vertex to the posterior transverse indentation of the pronotum, somewhat paler in the middle; upon the latter, rather broadly bordered by yellowish-white throughout. Face and mouth parts together with the genital arma-

ture of the male ochreous; ovipositor light reddish brown. Tarsi and sometimes also the tibiae a trifle infuscated.

Length of body, ♂, 16 mm., ♀, 17.5 mm.; of antennæ, ♂ and ♀, about 50 mm.; of pronotum, ♂, 3.8 mm., ♀, 4 mm.; of tegmina, ♂, 19 mm., ♀, 20 mm.; of hind femora, ♂, 14 mm., ♀, 15 mm.; of ovipositor, 11-12 mm.

This particular species is quite common in the vicinity of West Point, Nebraska, about the margins of ponds and along the edges of streams where it frequents rank growing grasses and sedges. I have also taken it several times at the electric lights in the city of Lincoln, while it was observed to be very common in the sand hill region of Wheeler, Garfield and Holt counties. It has never been found by me outside of the State, nor has it been sent to me from beyond our boundary.

Its song is very low and more rapid than that of *O. glaberrimum* and *O. vulgare*.

The uncommonly long ovipositor of this insect would indicate a slight variation from the normal egg-laying habits of the other members of the genus; but just what this variation is has not been ascertained.

Orchelimum gladiator, n sp.—This second species of meadow grasshopper of the genus *Orchelimum* which is now characterized, appears to be quite distinct from all other described North American forms. Its chief distinguishing character is its very broad, nearly straight ovipositor of more than the ordinary length. In its general structure it resembles the more robust species like *O. glaberrimum* and *O. concinnum*. It differs from these, however, in having shorter legs and antennæ. The posterior femora are rather slender; the cone of the vertex is short and obtuse, with the extreme tip shallowly sulcate; the eyes are rather large but not prominent, the hind wings are little if any longer than the tegmina, which do not quite reach the tip of the ovipositor.

Colour, pale transparent grass-green throughout, save the usual markings upon the occiput and disk of the pronotum which are dark brown, on the latter composed of two well defined narrow, slightly diverging lines. The dorsal portion is also tinged with brown. Antennæ rufous; feet and extreme tip of the ovipositor tinged with rufous.

Length of body, ♀, 18 mm.; of antennæ, 35 mm.; of pronotum, 4.75 mm.; of tegmina and wings, 19 mm.; of posterior femora, 15.5 mm.; of ovipositor, 10 mm.; greatest width of ovipositor, 1.82 mm.

Described from two female specimens taken upon the flowers of one

of the golden rods (*Solidago rigida*) at West Point, Nebraska, during the latter part of the month of September, 1886. Male not known to me.

The species is evidently quite local in its distribution; and perhaps also quite rare. A better knowledge of the habits of our North American Orthoptera may also aid in finding them.

There is a single female specimen of a closely allied, though distinct species, in my collection, which was taken in the District of Columbia. This latter form is also undescribed, and can be known temporarily as *Orchelimum minor*, from its rather small size and short wings. It is slenderer and in every way smaller than *O. gladiator*. In colour it is rather less green than usual, and has the brown markings very decided. Its ovipositor which resembles that of *gladiator* is also brown instead of green.

I have still other undescribed *Orchelimums* in my cabinet, but must postpone their description for a future paper. If others who have specimens of these insects in their collections which do not appear to have been described, and they do not care to work them over themselves, it would be deemed a favour if they were sent to the writer, who would then endeavour to prepare a paper on the two genera which would include all of the known as well as any new forms that might still remain undescribed.

In addition to several described species of *Conocephalus*, we have here in Nebraska a heavier bodied and shorter winged form than the *C. ensiger* Harris, which appears to be new.

Conocephalus nebrascensis, n sp.—Most closely related to *C. ensiger*. Cone of the vertex entirely black beneath; ovipositor long and lance-like.

Cone of the vertex rather slender, its sides parallel from a little in advance of the eyes to its middle, from which point it tapers to the rounded apex; the basal tooth quite prominent. Eyes large and prominent, usually dark coloured. Pronotum large and broad, the shoulders well defined, the posterior extremity broadly rounded, the deflected lobes or "side laps" spreading below; the entire surface rather shallowly punctate, glabrous. Tegmina coriaceous, with large coarse tympanum in the male—very similar to that of *C. crepitans* and *C. robustus* Scudd. Posterior femora moderately slender, short, and with both the inner and outer lower carinae provided with spines. Anal cerci stout, with strong internal hooks; sub-genital plate quite large and broad; the projecting "digits" widely separated and small. Ovipositor long and slender,

lanceolate, a little curved upwards and extending about one-fourth of an inch beyond the closed tegmina.

General colour bright grass-green, with yellowish lines along the lateral carinae of the pronotum. Posterior tibiae together with all the feet more or less infuscated. Antennae testaceous or rufous.

Length of body, ♂, 28 mm., ♀, 32 mm.; of cone, ♂ and ♀, 3.5 mm.; of pronotum, ♂ and ♀, 8 mm.; of tegmina, ♂, 36 mm., ♀ 40 mm.; of hind femora, ♂, 20 mm., ♀, 23 mm.; of ovipositor, 30 mm.

Habitat.—Found throughout the eastern part of the State, where it occurs most frequently in the natural groves growing along our principal streams. I have also seen specimens of it that were taken in Iowa and Illinois, and have specimens from both of these last named States in my collection.

Amblycorypha Scuddera, n sp.—Very similar to, but smaller than the *A. oblongifolia*.

Pale to dark green. Disk of the pronotum flat, gradually expanding posteriorly; the lateral angles or shoulders quite sharp; the lateral lobes with their posterior lower edge broadly rounded. Tegmina quite heavy and opaque, rather rough and of a dull green colour—especially so in the female specimens; the costal area full and evenly rounded. Posterior femora moderately stout, slightly surpassing (♀) or not quite reaching (♂) the tips of the tegmina, their inner margin furnished with 7 or 8 short spines. "Shrilling" field of the tegmina large and flat, as in *oblongifolia*, a little broader than the posterior extremity of the pronotum. Ovipositor evenly curved, the apical third strongly toothed.

Length of body, ♂, 22 mm., ♀, 22 mm.; of pronotum, ♂, 6 mm., ♀, 6.65 mm.; of tegmina, ♂, 33 mm., ♀, 32 mm.; width of tegmina, ♂, 10 mm., ♀, 10.5 mm.; length of hind femora, ♂, 28 mm., ♀, 29 mm.; of ovipositor, 11 mm.

One of our commonest katydids throughout the eastern or wooded portion of Nebraska. It is especially numerous among the groves of oaks and other hard wood trees.

Like *oblongifolia*, this katydid produces the peculiar chick-chick noise which is so characteristic a sound in our groves at night during the months of August and September. *Scuddera* is to be distinguished from that species by its smaller size, the more evenly rounded or arcuate edges of the tegmina, the comparatively shorter hind legs, and the more strongly serrated point of the female ovipositor.

SOME INDIANA ACRIDIDÆ.

BY W. S. BLATCHLEY, TERRE HAUTE, INDIANA.

But little attention has heretofore been given to the *Acrididæ* inhabiting Indiana by the working scientists of the State. No record of any published paper relating to them can be found, and it is believed, we suppose, that because Indiana lies next to Illinois, where Dr. Cyrus H. Thomas did much of his work, that most if not all of the species of the family found in this State are included in the two lists of the Orthoptera of Illinois prepared by him.

That such belief is an erroneous one, is shown by the fact, that in the single county of Vigo, which lies adjacent to the eastern border of Illinois, and midway between the north and south boundaries of this State, seven species have been taken by the writer which are not given in either of Thomas's lists, three of which have not heretofore been recorded nearer Indiana than New England, or the Gulf States, and the remaining four no nearer than Kansas.

Believing that a list of those taken in the county would prove of value as a basis for a more complete list of those inhabiting the State, the one below has been prepared. The nomenclature is that agreed upon by the most prominent authorities of the present time, and is for the most part derived from the works of Scudder and Saussure. In order that it may not confuse beginners who may use the list for reference, I give the synonymy of the descriptions of the different species as gathered from the literature to which I have had access. Brief notes relating to the comparative abundance, places of resort, and variations where noted, of each species are also given.

My especial thanks are due to Prof. Lawrence Bruner, of Lincoln, Nebraska, and to Mr. S. H. Scudder, of Cambridge, Massachusetts, for the verification of doubtful species and for information regarding the heretofore known range of the rarer ones.

The following works have been consulted in the study of the species listed, and to them reference is made in the synonymy given:—

Harris, Dr. T. W.—Treatise on Some Insects Injurious to Vegetation. 3rd edition. 1862.

Riley, Packard and Thomas.—Reports of the U. S. Entomological Commission, 1877, 1878, 1883.

Riley, C. V.—Report of U. S. Entomologist in U. S. Agricultural Report for 1883.

- Saussure, Henri D.—*Prodromus (Edipodiorum Insectorum, etc.* Geneva, 1884.
- Scudder, S. H.—“Catalogue of the Orthoptera of N. A.,” 1867. Proceedings of the Boston Society of Nat. History, XVII., XIX. and XX., 1875, 1877, 1879.
- Thomas, Cyrus H.—“Insects Injurious to Vegetation in Illinois,” in the Transactions of the Illinois State Agricultural Society, V., 1865; “Synopsis of the Acrididæ of N. A.,” 1873; “List of the Orthoptera of Illinois,” in Bulletin I. of the Illinois Museum of Natural History, 1876; “The Acrididæ of Illinois,” in the Ninth Report of the State Entomologist of Illinois, 1880.

ACRIDIDÆ.

ACRIDINÆ.

TRUXALINI.

1. TRUXALIS BREVICORNIS, Linn.

Pyrgomorpha brevicornis, Thos., Syn. Acrid., N. A., 1873, 67.

Truxalis brevicornis, Id., Ninth Rep. St. Ent. Ill., 1880, 97.

Opsomala punctipennis, Id., Trans. Ill. St. Agl. Soc., V., 1865, 447.

Pyrgomorpha punctipennis, Id., Syn. Acrid. N. A., 1873, 68.

About a dozen specimens of this rare species were taken from tall coarse grass, near the border of a pond, on Oct. 11, 1890. Its range is southern, and Vigo county is, as far as known, the most northern point at which it has been collected. The female varies in colour from a bright pea green to a uniform rusty brown. The males, which are much smaller, have the back green and the rest of the body brown.

2. CHRYSOCHRAON VIRIDIS, Scudd. Short-winged Green Grasshopper.

Chrysochraon viridis, Thos., Syn. Acrid. N. A., 1873, 76.

Chloealtis viridis, Id., Ninth Rep. St. Ent. Ill., 1880, 99.

Opsomala brevipennis, Id., Trans. Ill. Agl. Soc., V., 1865, 451.

This species is quite frequent in the coarse grass which grows in open wet places, and is also at times to be found along the borders of woods. It is coloured much like the preceding, and the variations are the same.

3. CHRYSOCHRAON CONSPERSA, Harris. The Sprinkled Grasshopper.

Locusta conspersa, Harris, Ins. Inj., 1862, 184.

Chrysochraon conspersum, Thos., Syn. Acrid. N. A., 1873, 76.

Chloealtis conspersa, Id., Ninth Rep. St. Ent. Ill., 1880, 99.

Locusta abortiva, Harris, Ins. Inj., 1862, 184.

Rare. A single pair in copulation were taken Oct. 11, 1890, and two or three others two weeks later, one of which, a female, had the elytra extending slightly beyond the tip of the abdomen.

4. SYRBULA ADMIRABILIS, Uhler. The Handsome Grasshopper.

Stenobothrus admirabilis, Thos., Syn. Acrid. N. A., 1873, 84.

Syrbula admirabilis, Id., Ninth Rep. St. Ent., Ill., 1880, 100.

The females of this fine species are not uncommon in upland meadows, and along fence rows. The males are, however, seldom seen, probably on account of their smaller size and duller colour.

5. CHLOEÄLTIS CURTIPENNIS, Harris. The Short-winged Brown Grasshopper.

Locusta (Chloeältis) curtipennis, Harris, Ins. Inj., 1862, 184, pl. III., fig. 1.

Stenobothrus curtipennis, Thos., Syn. Acrid. N. A., 1873, 91.

Id., Ninth Rep. St. Ent., Ill., 1880, 104.

Scarce. It frequents meadows and damp, swampy places which are covered with a rich growth of grass.

OEDIPODINI.

6. CHORTOPHAGA VIRIDIFASCIATA, De Geer. The Green-striped Grasshopper.

Locusta viridifasciata, Harris, Ins. Inj., 1862, 182, pl. III., fig. 2.

Thos., Trans. Ill. St. Agt. Soc., V., 1865, 451.

Tragocephala viridifasciata, Id., Syn. Acrid. N. A., 1873, 103.

Id., Ninth Rep. St. Ent., Ill., 1880, 105,
figs. 13, 17.

Scudder, Proceed. Bost. Soc. Nat.
Hist., XVII., 1875, 481.

The full-grown individuals of this species are more common in May and June than those of any other grasshopper, as its larvæ hibernate, whereas most other species pass the winter in the egg state. It frequents dry, open woods and roadsides, where the half-grown young can be seen jumping vigorously about on any warm sunny day in winter.

- 6 (a). CHORTOPHAGA VIRIDIFASCIATA INFUSCATA, Harris. The Dusky Grasshopper.

Locusta infuscata, Harris, Ins. Inj., 1862, 181.

Tragocephala infuscata, Thos., Syn. Acrid. N. A., 1873, 102.

Tragocephala viridifasciata infuscata, Id., Ninth Rep. St. Ent., Ill., 1880, 106.

Scudd., Proceed. Bost. Soc. Nat. Hist., XVII, 1875, 481. *

This dark variety of the green-striped grasshopper is quite frequent in April and May, but rare after June 1, when *viridifasciata* seems to take its place. It is probably a mere seasonal form of that species.

7. ENCOPTOLOPHUS SORDIDUS, Burm. The Clouded Grasshopper.

Ædipoda sordida, Thos., Syn. Acrid. N. A., 1873, 116.

Tragocephala sordida, Id., Ninth Rep. St. Ent., Ill., 1880, 107.

Encoptolophus sordidus, Scudd., Proceed. Bost. Soc. Nat. Hist., XVII, 1875, 479.

Locusta nebulosa, Harris, Ins. Inj., 1862, 181.

Rather common in upland meadows and pastures as late as Nov. 22, but is never found about wet places. The males, although small in size, stridulate just as they arise from the ground with a loud crackling noise similar to that made by burning stubble. It flies but a short distance before alighting.

8. ARPHIA SULPHUREUS, Fab. The Yellow-winged Grasshopper.

Locusta sulphurea, Harris, Ins. Inj., 1862, 177, pl. I., fig. 6.

Tomonotus sulphureus, Thomas, Syn. Acrid., N. A., 1873, 105.

Id., Ninth Rep. St. Ent., Ill., 1880, 107.

Although very common in some parts of Indiana, this is a scarce grasshopper in Vigo Co., where the next species seems to take its place. It frequents dry open woods and roadsides.

9. ARPHIA XANTHOPTERA, Burm.

Tomonotus xanthopterus, Thos., Syn. Acrid., 1873, 105.

Tomonotus sulphureus xanthopterus, Id., Ninth Rep. St. Ent. Ill., 1880, 108.

A common species in dry, sandy fields, prairies and borders of meadows. When flushed it flies for a long distance in a zigzag way, the male making a loud rattling noise with every onward motion. Dr. Thomas in his later writings classed *xanthoptera* as a variety of *sulphureus*, but I have carefully compared a large number of specimens of each, and can find no intermediate forms.

9 (a). ARPHIA XANTHOPTERA CARINATA, Scudd.

Tomonotus carinatus, Thos., Syn. Acrid., N. A., 1873, 106.

Tomonotus sulphureus carinatus, Id., Ninth Rep. St. Ent. Ill., 1880, 108.

Six or eight specimens of a grasshopper, which, from the descriptions cited above, I take to be the one described by Scudder as *Cedipoda carinata*, were taken. It is, as Dr. Thomas says, very closely allied to *xanthoptera*, but is always darker, the colour approaching a black; the inner wings are deep reddish yellow, and the median carina of the pronotum higher than in that species. Moreover, the stridulation of the male is different, as it can be heard for rods away, the loud chr-r-r-r being sounded just as it leaves the ground, and not while on the wing, as is that of *xanthoptera*. These differences, however, are so minor that I follow Thomas in placing it as a variety of that species.

10. SPHARAGEMON BALTEATUM, Scudd.

Spharagemon balteatum, Scudder, Proceed. Bost Soc. Nat. Hist., XVII., 1875, 469.

A rare species found in dry, open, upland woods. Four specimens were taken Oct. 12, two in copulation. It is not included in either of Dr. Thomas's Illinois lists, and although it ranges from Maine to Texas, has not before been recorded closer than New Jersey on the east and Kansas on the west.

11. DISSOSTEIRA CAROLINA, Linn. The Black-winged Grasshopper.

Locusta carolina, Harris, Ins. Inj., 1862, 176, pl. III., fig. 3.

Cedipoda carolina, Thomas, Syn. Acrid. N. A., 1873, 117.

Id., Ninth Rep. St. Ent., Ill., 1880, 111.

This common species is readily known by its broad, black, yellow-bordered hind wings, and by its habit of flying rather than hopping when disturbed; many persons taking it for a butterfly when it is on the wing. It is more often found along roadsides and railways than in meadows and pastures.

12. HIPPISCUS RUGOSUS, Scudd. The Clumsy Grasshopper.

Cedipoda rugosa, Thos., Syn. Acrid. N. A., 1873, 132.

Hippiscus, corallipes rugosa, Id., Ninth Rep. St. Ent., Ill., 1880, 115.

This large, thick-bodied species is rather common in autumn, its favorite resorts being timothy stubble or open, upland pastures. When

disturbed it flies but a short distance, and without noise, except the flutter of its wings. When on the ground it is very clumsy, on account of its large size, and is easily caught with the hands.

12 (a). *HIPPISCUS RUGOSUS PARADOXA*, Thos.

Ædipoda paradoxa, Thos., Syn. Acrid. N. A., 1873, 132.

Four very large specimens, having the base of wings a bright coral red instead of yellow, were taken. The dark spots on the elytra also varied slightly from those of the typical *rugosus*, but other than this I could detect no differences, and I hence refer them to the above-named variety.

13. *HIPPISCUS PHÆNICOPTERA*, German. The Coral Winged Grasshopper.

Ædipoda phænicoptera, Thos., Syn. Acrid. N. A., 1873, 135.

Hippiscus phænicopterus, Id., Ninth Rep. St. Ent., Ill., 1880, 117, figs. 14, 18.

Locusta corallina, Harris, Ins. Inj., 1862, 176.

An uncommon species, frequenting open woods and meadows from May to September, but rarely found in late autumn. It resembles *H. rugosus* in form and size, but is more active and stridulates much louder than that species. The larvæ evidently hibernate as the imagoes are found so early in the season.

ACRIDINI.

14. *SCHISTOCERCA AMERICANA*, Drury. The American Grasshopper.

Acridum americanum, Thos., Trans. Ill. St. Agl. Soc., V., 1865, 448.

Id., Syn. Acrid. N. A., 1873, 172.

Id., Ninth Rep. St. Ent., Ill., 1880, 129, fig. 10.

This large and handsome grasshopper was quite common, even as late as Nov. 22, along fence-rows, borders of thickets and in low, open oak woods, but was seldom seen in open meadows or pastures. More often than any other species it is found on fences, and when flushed it rises quickly and with a whirring noise, made by its wings in flight. It moves rapidly a long distance, and very frequently alights in a bush or low tree instead of on the ground.

15. *ACRIDIUM ALUTACEUM*, Harris. The Leather-colored Grasshopper.

Acridium alutaceum, Harris, Ins. Inj., 1862, 173.

Thos., Syn. Acrid. N. A., 1873, 171.

A rare species, having been noted on but one occasion, along the sandy embankment of a railway, when, perhaps, a dozen specimens were taken on Oct. 11. The males were very brightly coloured, having evidently just moulted for the last time. Like the preceding species, it flies more often than it hops, moving with the same rapid flight, but not so far as *S. Americana*.

A single specimen of this species was taken in Monroe Co., Ind., in 1886, and at the time was referred to *A. emarginatum*, Uhler, with the description of which, as given by Thomas, it closely agrees. It is not recorded from Illinois, nor from any locality nearer than Kansas, as far as I can ascertain.

16. PEZOTETTIX ROTUNDIPENNIS, Scudd. The Round-winged Grasshopper.

Pezotettix rotundipennis, Scudd., Proceed. Bost. Soc. Nat. Hist., XIX., 1877, 86.

This species was named for me by Dr. Scudder, as I did not have the description cited above at the time it was taken. It has been known heretofore only from Florida. In Vigo County it is rather scarce, and frequents the borders of blue grass pastures and roadsides. The female appears much more common than the males, only two or three of the latter having been seen. It has been taken as late as Nov. 22, when two females were found on the lower plank of a fence enjoying the sunshine. A single pair were noted in copulation Oct. 11, 1890.

17. PEZOTETTIX SCUDDERI, Uhler. Scudder's Grasshopper.

Pezotettix scudderi, Thos., Syn. Acrid. N. A., 1873, 152.

Id., Ninth Rep. St. Ent., Ill., 1880, 121.

In October and November this species is very common in open woods and pastures, especially near the borders of them, where upon the lower part of the fences it delights to collect during the short autumn afternoons.

18. PEZOTETTIX VIRIDIPES (?) Walsh, Mss.

A single specimen taken from the roadside on Oct. 11, 1890, was referred to Dr. Scudder for identification. He returned it with the above name marked doubtfully, stating that it "differed from the typical specimen in the nearly complete obliteration of the median carina of the prozona." I have seen no description of it.

19. PEZOTETTIX GRACILIS, Bruner.

Pezotettix minutipennis, Thos., Bull. Ill. Mus. Nat. Hist., I., 1876, 66.

Id., Ninth Rep. St. Ent. Ill., 1880, 119.

Pezotettix manca (?) (Smith), Thos., Syn. Acrid. N. A., 1873, 149.

This species was identified as *P. minutipennis*, Thos., and sent to Mr. Bruner for verification. He referred it to *P. gracilis*, Bruner, of which I have no description, but Scudder. Proceed. Bost. Soc. Nat. Hist., XX., 1879, 77, says that *minutipennis* is a synonym of *gracilis*. It differs but slightly from the description of *P. manca*, Smith, as given by Thomas in his Synopsis, and in my opinion the latter is also a synonym.

About a dozen specimens were taken from low open woods. The sexes were found paired Oct. 11 and Nov. 1.

20. PEZOTETTIX VIOLA, Thos.

Pezotettix viola, Thos., Bull. Ill. Mus. Nat. Hist., I., 1876, 68.

Id., Ninth Rep. St. Ent. Ill., 1880, 120.

Caloptenus nigrescens, Scudd., Proceed. Bost. Soc. Nat. Hist., XIX., 1877, 27.

Among some grasshoppers sent to Mr. Bruner were two which I had identified as *P. viola*, Thos. He returned their name as *P. occidentalis*, Bruner. Specimens were afterwards sent to Mr. Scudder, who referred them to *P. nigrescens*, Scudd., and wrote that he had *P. occidentalis*, and that it was certainly distinct from *P. nigrescens*, but that he had never yet determined *P. viola*. At the same time he forwarded his description of *P. nigrescens*, cited above, which after careful comparison I believe to be synonymous with *P. viola*, the latter having the precedence. Having never seen a description of *P. occidentalis* I cannot say as to whether *P. viola* is a synonym of it or not.

The species is not a common one, only a half a dozen specimens having been taken. It is found in company with *P. scudderi* in open woods. *P. viola*, according to Thomas, occurs in central and southern Ill. *P. nigrescens* was described from Georgia.

21. MELANOPLUS MINOR, Scudd.

Caloptenus minor, Scudd., Proceed. Bost. Soc. Nat. Hist., XVII., 1875, 478.

This is a Western species not having been taken before east of Central Illinois. But two specimens were taken. They were found in company with the next species along the borders of a woodland pasture on October 11.

(To be continued;)

PREPARATORY STAGES OF DATANA PERSPICUA, G. & R.,
AND CERURA BOREALIS, BOISD.

BY HARRISON G. DYAR, NEW YORK.

DATANA PERSPICUA.—*Egg*: In general shape subpyriform; flattened at base and top, depressed centrally at vertex, the usual black spot small and indistinct, situated at the bottom of the punctiform depression; the whole surface punctured. Colour white, the lid-like top of a somewhat brighter white. Width .9 mm., height .8 mm. The egg is of the type of *D. major*, but resembles the type of *D. ministra* in coloration by possessing a discoloured lid-like top. This is the part of the shell eaten by the young larva in hatching. Laid in masses of varying numbers on the under side of the leaves of the food plant.

First stage: When first hatched the head is black, .5 mm. wide; the body yellowish with a reddish dorsal and subdorsal line, not reaching the extremities; cervical shield, feet and anal plate black. As the stage advances the body becomes reddish with four lateral yellow stripes on each side and three ventral, as in allies, which remain throughout the larval stages. They are nearly as wide as the intervening lateral spaces, a little confluent posteriorly and are coloured yellow. Black hairs arise from small black tubercles and from the elevated anal feet. Length near completion of this stage about 5 mm.

Second stage: Head higher than wide, slightly punctured, black; width 1.1 mm. Body parts coloured as before. The hair is short, blackish and arises from minute tubercles that are much smaller than in the previous stage.

Third stage: Head shiny black, punctured, the clypeus smooth; width 1.6-1.8 mm. Cervical shield, anal plate and thoracic feet black. Body dark red, the stripes broader than the intervening spaces, bright yellow; abdominal feet red, the anal pair black. A few short hairs; spiracles small, black.

Fourth stage: Head as before, or in other examples, bright wine-red, the lower part of the clypeus, eyes and mouth parts, black; width 2.7 mm. Body as before, the stripes partly confluent posteriorly, hardly so anteriorly; spiracles black, larger than before. Or the cervical shield and anal plate may be wine red, the stripes broad, lemon yellow, moderately confluent at both ends; thoracic and anal feet and the abdominal feet outwardly very slightly black. Hair 5 mm. long, whitish, besides other more abundant fine short hair.

Fifth stage: Head rounded, depressed at the sutures of the clypeus, punctured, shining, usually black; width 4.1 mm.; cervical shield, anal plate and legs black, except occasionally the shield, plate and nearly all of the head is wine-red, or rather blood-red. All kinds of intergrading examples occur. The body is usually black, rarely red, the stripes broad, bright lemon-yellow, somewhat confluent posteriorly. Hair whitish, rather abundant but not long, with other more numerous short, brownish hairs. Bases of abdominal feet a little reddish. In two examples the stripes were much narrower than usual, especially posteriorly, and were much broken, the upper ones consisting of series of little yellow dots. Both had black heads, and they were not alike, as one was much nearer the normal form than the other.

Pupa: Formed in a subterraneous cell, cylindrical; the abdominal segments gently rounded; sutures deep, capable of motion; cases moderately prominent, especially those covering the palpi; two cremasters, very short, each bearing two spines, the outer the shorter, all in a transverse line; cases finely creased; body densely punctured; colour mahogany-red; cremasters blackish. Length 24 mm; width 7 mm. The species is single brooded, though occasionally a few individuals may emerge the same year in confinement, possibly indicating two broods in the southern part of its habitat.

Food plants: Sumach (*Rhus glabra* and *R. typhina*).

Larvæ from Duchess and Ulster counties, N. Y. Abundant; the commonest species of *Datana* in the electric lamps at Poughkeepsie. This larva is well protected by its coloration, which resembles the usual colours (bright red and yellow) of dying Sumach leaves, and it is usually on the lower parts of the bush where such coloured leaves occur that the larvæ amass themselves, especially when young.

CERURA BOREALIS, Boisd.—*Egg*: Less than hemispherical—obtusely conoidal, the base flat; minutely shagreened; colour black; a little lustrous, but not shiny. Laid singly on either surface of the leaf.

* * * * *

Second stage: Head red-brown, not shiny, the upper half darker; mouth parts blackish; width 1.1 mm. A pair of subdorsal horns on the prothoracic segment, short and spinose; stemapods 5 mm. long, only slightly spined; a transverse row of minute spines on each segment. Body purplish brown over the dorsum nearly to the spiracles, this colour cov-

ering the thoracic segments entirely and ventrally on the seventh to the tenth abdominal segments. The rest of the body is green. The back centrally is a little paler than elsewhere, especially on the metathoracic and first abdominal segments, except in a dorsal line. Spiracles minute, black ringed. Stemapods dark red-brown, twice annulated with whitish and tipped with the same colour. Thoracic feet black; abdominal feet green.

Third stage: Head non-lustrous dark wine-red, paler on the lower part, minutely but thickly mottled with little paler spots; ocelli black; antennæ pale; width 1.6 mm. Cervical horns tuberculated, each with a hair; tails spinose. Thoracic segments, dorsal half of body nearly to spiracles and the last three abdominal segments (joints 12 and 13) ventrally, brownish vinous, as are also the "tails," but for the two broad whitish annulations. The rest of the body is green; the thoracic feet pale testaceous. Piliferous tubercles as before. As the stage advances the brown colour on the dorsum fades out on the posterior thoracic and first abdominal segments (joints 3-5), leaving a triangular patch on the two anterior thoracic segments (joints 2 and 3), which is narrowly connected with the rest of the dorsal colour by a line on the metathoracic segment (joint 4), that rapidly widens on the first abdominal segment (joint 5).

Fourth stage: Head brownish wine-red, the upper two-thirds thickly covered with little round reddish dots, but leaving a narrow line of the ground colour on each side of, and parallel to, the central suture; paler or yellowish at the sides posteriorly; ocelli blackish; antennæ white, brownish toward the tips; width 2.5 mm. Cervical shield red-brown, speckled like the head with little dots but less thickly; the horns on either side of it thick, round, tuberculated; stemapods 9 mm. long, curled up a little at the ends, spinose and coloured red-brown, twice annulated with sordid white. The extensile threads are pinkish at base with a white ring, the terminal part black. Body a little elevated dorsally on the posterior part of the mēsothoracic segment (joint 3) but without any process on the metathoracic segment. It is pale green with a broad ferruginous-brown dorsal band which is triangular on the first two thoracic segments, covering the horns, narrows to a line on the metathoracic segment and widening continuously again just reaches the spiracle on the fourth abdominal segment (joint 8), after which it narrows, reaching a minimum in the suture between the seventh and eighth abdominal segments (though still quite wide), widens a little and slightly contracts to cover the anal plate. The band contains some minute

piliferous tubercles and is faintly bordered with yellow. Spiracles pale ochre; venter paler, whitish, with a purple medio-ventral line on the eighth to the tenth abdominal segments. Feet concolorous with the body. As the stage advances some small brown spots appear on the sides.

Fifth stage: Head rounded, flat in front, the clypeus a little depressed, with two vertical ridges below; colour purplish brown, the little yellowish spots arranged as before; clypeus and mouth reddish, jaws black outwardly; antennæ reddish, their bases yellow; ocelli black; the lateral posterior part of the head pale yellow; width 3.6 mm. A few hairs. Body shaped as in the previous stage, the cervical horns present but small, smooth, punctured at the ends, projecting laterally in line with the cervical shield. Tails tuberculated, each tubercle with a fine spine; 11 mm. long; extensile threads black with a white ring, yellowish at base. Body pale whitish-yellow, becoming pale lemon-yellow, the dorsal band ferruginous-brown, shaped as before. On the cervical shield it is marked like the head and bisected by a narrow pale dorsal line; it covers the upper part of the cervical horns, passes below the spiracle on the fourth abdominal segment, narrows to a minimum on the eighth abdominal segment (where it is thrice as wide as on the metathoracic segment) and ends elliptically, covering the anal plate. It is edged with blackish brown and contains a diffuse dorsal and three oblique lateral bands of the same colour, posterior to the latter of which are faint yellowish mottlings. In the lateral angle of the band is also a blackish-brown shade. Tails concolorous, twice annulated with pale yellow. On the lateral region are a few minute hairs and some faint brown spots. Spiracles ochre in a very narrow brown border, and obscurely surrounded by brown clouds. A series of subventral blackish-brown spots and a medio-ventral line posteriorly. Thoracic feet brownish testaceous; abdominal feet pale yellow. The erect spines at the anus are black. Length of larva, exclusive of the stemapods, 22 mm. As the stage advances the dorsal band becomes paler, the cervical shield pinkish, and the markings are more distinct.

Cocoon: Like those of the other species of *Cerura*, but rather flatter for its size. Length 38 mm.; width 11 mm.; height above the surface of the wood 6 mm.

Pupa: Cylindrical, flattened a little on the ventral side, the ends rounded, not tapering; cases prominent, those covering the antennæ

large ; a slight depression behind thorax dorsally ; no cremaster ; colour red-brown ; cases finely wrinkled ; dull ; body smooth, slightly shiny. Length 17 mm.; width 5 mm. Duration of this stage, through the winter.

Food plant : Wild Cherry (*Prunus serotina*).

Larvæ from Dutchess Co, N. Y.

Widths of head for the several stages, calculated from the width at the last stage, ratio .68, are :—.77 mm., 1.13 mm., 1.66 mm., 2.45 mm., 3.6 mm. Observed :—1.1 mm., 1.6 mm., 2.5 mm., 3.6 mm.

The species of *Cerura* may be separated as follows :—

Primaries crossed at basal third by a dark gray band.

Primaries white.

Six black spots in an ellipse on disk. *borealis*, Bd.

Indistinct dental lines on disk.

Transverse band broad. *aquilonar*, Lintn.

Transverse band narrow, sometimes broken. . . *albicom*, Strk.

Primaries pale cinereous.

Three dentate lines on disk. *occidentalis*, Lintn.

A row of dots on disk. var. *cinereoides*, Dyar.

Primaries dark cinereous *cinerea*, Walk.

Primaries crossed by many dentate black lines.

Secondaries white.

Lines continuous. *scitisc*, Walk.

Lines interrupted. var. *candida*, Lintn.

Secondaries black. *multisc*, Riley.

Of these the larvæ of four are known and can be separated by the following table :—

No dorsal process on metathoracic segment.

Edges of dorsal band even.

Dorsal elevation on mesothoracic segment simple . . . *bore-*
[*alis*, Bd.

Dorsal elevation double *occidentalis*, Lintn

Edges of dorsal band irregular.

Band spotted with yellow. *cinerea*, Walk

Band spotted with crimson and yellow. . . . var. *cinereoides*,
[Dyar.

A distinct dorsal process on the metathoracic segment. . . . *multi-*
[*scripta*, Riley.

Walker* records "*C. bifida*, var. ?" from Hudson's Bay, and Butler† doubtfully refers a specimen from Mendocino Co., Cal., to *Cerura bicuspis*, Borkh., but it seems probable that these specimens belong to some of the American species, and at any rate these references are not positive enough to warrant the inclusion of the names in the list.

Cerura scolopendrina is known to me only by Boisduval's description, which is vague, and I have not included it in the table.

Cinereoides is a form of *cinerea*, as I have pointed out, and I consider *candida* as a variety of *scitisscripta* chiefly on the authority of Mr. Graef and of Dr. Strecker. Mr. Graef has shown me that there is no difference in pattern between the two, while Dr. Strecker assures me that they were "raised from the same lot of eggs."

THE MOOSE FLY—A NEW HÆMATOBIA.

BY WM. A. SNOW, UNIVERSITY OF KANSAS, LAWRENCE.

Entomologists will be interested to learn of the occurrence of a near relative of the Horn Fly, *Hematobia serrata*, in the middle of the great cranberry swamps of Northern Minnesota. These vast low areas extend for hundreds of square miles in the vicinity of the Lake of Woods. They are the favored home of the American moose, and the hope of obtaining some specimens of this animal for the museum of the University of Kansas led Professor L. L. Dyche of that institution to traverse these dangerous marshes. Professor Dyche has recently returned after remaining for over three months in the very centre of the swamps, camping upon the occasional sand ridges which cross the region; and to him I am indebted for specimens of a new *Hematobia*.

The flies were noticed first upon skinning the first moose, when a number of them were discovered in the animal's rectum, into which they had crawled for two or three inches in order to deposit their eggs in the excreta. The dejecta upon the ground were also found to contain hundreds of the eggs. Altogether nineteen moose were killed and in almost every case these flies were observed about them, remaining upon

*Cat. British Mus., Vol. IV., p. 985.

†Ann. and Mag. Nat. Hist., Vol. VIII., p. 317.

their carcasses as long as they lay unskinned, which was often twenty-four to thirty hours. For some time after the death of the animal, the *Hæmatobie* could be seen only with difficulty, concealed as they were by the mosquitoes which were incredibly numerous, lingering in clouds upon the dead moose as long as any of its juices could be extracted. The flies seemed to prefer the regions of the head, rump and legs where the hair is shortest. It is highly improbable that they find a resting place upon the horns of the moose. The male moose go thrashing about in the underbrush with tempestuous energy. They use their horns during a great part of the year to scrape away the bark from trees ; and they have a way of winding them in among the bushes when a rival is near, as a challenge. The females, as is well known, have no horns. The present species is very probably indigenous, infesting as it does an animal not in domestication ; and inhabiting such secluded inland portions of this continent. The moose obtained by this expedition were all killed far within the swamp, fifteen to twenty miles from firm land ; and it is only in such places that this now rapidly disappearing animal can be found. This region is rarely visited by white men, and the few Indians that venture there wait until the surface of the fens is frozen over. It is not altogether unlikely that this fly infests the caribou also. It was hardly possible to observe its actions on the living moose ; but we know that it lays its eggs in the excrement, and in all probability it resembles *H. serrata* in other habits as well.

Professor Dyche heard no complaints from owners of stock on the borders of the swamp of the ordinary Horn Fly, or of any similar fly. The cattle are, however, tormented with mosquitoes, and smudges are kept constantly burning to which they may run for relief.

Hæmatobia alcis, n. sp. Male.—Length 4–6 mm. Front narrow, with concave sides ; central portion black with yellowish pollinose orbital stripes ; sides of front further marked by a row of long, sparse, black hairs. Antennæ blackish-brown ; second joint sub-globular ; third joint slightly longer than broad, with square corners, and slightly concave on the inner side. Arista black, base enlarged. Pectinations long ; sometimes one or two hairs on inferior side. Face and cheeks black, sparsely clothed with black hairs. Palpi long, porrect, gently spatulate, light yellow, with black hairs. Proboscis brownish-black. Dorsum of thorax greyish pollinose with yellowish tinge. Two very distinct black median stripes and an interrupted lateral stripe on either side. Thorax and

scutellum with long black bristles. Scutellum concolorous. Abdomen yellowish-grey pollinose, with black hair; a brownish-black median stripe, interrupted at the incisures; a pair of dusky spots on second and third segments, and sometimes also on the fourth. Legs simple, blackish-brown, except the yellow basal and immediate distal ends of femora and basal ends of tibiæ. Wings hyaline, somewhat dusky; base orange yellow.

Female.—Front wide and with straight sides. Hind femora light brown, except a subapical dusky band about one-third the length of the femur in width.

Nine males and ten females. The specimens are alcoholic, but in excellent preservation. They are now in the museum of the University of Kansas.

The following differences between *H. alcis* and *H. serrata* may be noted:—The former is larger. It has thin black pile on the cheeks, while in the latter the pile is golden and quite thick. The palpi of *H. alcis* are light-yellow in both sexes with no trace of black, except in the scattered black hairs. The stripes on the dorsum of the thorax are much more distinct. The legs differ considerably, being darker in colour; in the male they are blackish-brown, except the yellow basal and immediate distal ends of the femora, and basal ends of the tibiæ; the female has light brown hind femora varied by dusky bands near the distal ends. A more important difference, however, is the lack of the serrations which characterize the hind tarsi of the male *H. serrata*. Base of wings in the present species more broadly and brightly yellow.

Rondani defined the subgenus *Lyperosia*, to which *H. serrata* is referred, from two characters, namely: hairs of arista all superior, and anterior cross-vein opposite the termination of the first longitudinal vein. An examination of my specimens of *H. alcis* has discovered two with one or two hairs on the underside of the arista; and I may say, on the authority of Dr. S. W. Williston, that the relation of the small cross-vein to the end of the first vein in this and allied groups is very inconstant.

I have compared the present species with the descriptions of European species of *Hematobia* (except that of *H. irritans* which I did not have), and find that *H. ferox* approached it in some respects, but, brief as is the description, several important differences were noted.

CORRESPONDENCE.

REVISION OF THE GENUS AGROTIS.

Dear Sir,—A few words are called for by Mr. Grote's "remarks" in the March number of the CAN. ENT. The parts critical, of course, require no reply, and are really unexpectedly cordial; nor do the parts explanatory. Mr. Grote asks why I write *herelis*, *badinodes* and *insula*, instead of *herilis*, *badinodis* and *insulsa*. In each instance it is occasioned by an original misreading and mistranscription of the name, which had become so fixed that, often as I had seen and written the names, still persisted and prevented my seeing the error. I am obliged to Mr. Grote for pointing out these cases. Mr. Grote says: "With regard to the classification of the group it is conducted upon the basis first suggested by myself, *i. e.*, the forms with unarmed fore-tibiæ are separated, and other divisions are based upon genitalia and sexual characters." He refers to the CAN. ENT., XV., p. 51, March, 1883. In 1857 Lederer had already used *all* the characters suggested by Mr. Grote, and the latter has made absolutely *no* original suggestions for dividing the genus. Nor has Mr. Grote, anywhere in the Noctuidæ, used or suggested *new* characters. He has written as though I had found the basis for such work as I have done, in his writings. I wish distinctly to state that this is *not* the case. Herrich-Schaeffer, von Heinemann, Lederer, and others, all used the same characters that Mr. Grote has used. I claimed no originality for these bases of subdivision, and no credit is due to Mr. Grote therefor. In the systematic study of the sexual characters in this genus and in the American Noctuidæ I do claim originality. Lederer did not get the clasper in any case, and used only the external form of the harpes. Mr. Grote does not give any evidence, anywhere in his writings, that he went even as far as Lederer in this direction. Mr. Grote knows the writings to which I have referred, as his earlier papers sufficiently prove. In reference to my citations of determinations made by him in collections, these are always to specimens bearing a label in Mr. Grote's own handwriting, and where a type is referred to, it means a specimen so labelled by Mr. Grote himself. I refer now to Mr. Grote's paper in the Proc. Am. Phil. Soc., June, 1883, p. 176, for the following:—"I conclude this paper by briefly referring to the fact that I have determined my species in many collections. I enumerate those of Mr. Thaxter, Mr. Neumögen, Mr. Hy. Edwards, Mr. Tepper, and in the Albany collections. A large number of my types are in Mr.

Neumöegen's grand collection, and I have figured a good number of the species. There can thus be but few cases of doubt as to what I have described." All of these collections I have studied, and my references are to identifications made in them. I do not blame Mr. Grote for making errors, and had he not assumed so infallible a standard for himself in his criticism of others, would not have so often pointed them out. I am said also to have followed Mr. Grote's synonymy or "adopted" it. Altogether 59 species have synonyms. Of these 23 are originally stated by myself, Mr. Strecker gives one, Mr. Butler is responsible in whole or in part for six, two of them are mere citations of preoccupied names, and of the older species the synonymy is "adopted" by Mr. Grote from Walker in several instances. This is not scientific literature by any means, and I regret being responsible for it, but I cannot allow Mr. Grote's statement "that I have at least laid down the foundation for its proper study" to go unchallenged. Mr. Grote's work in the North American Noctuidæ has been a necessary one, and has been largely drudgery. No one can better appreciate than I the labor involved in identifying material, naming and describing it. That he made synonyms was simply natural and unavoidable, and is in no wise to his discredit. I expect to make them myself, and have done so already. Our noctuids are far from completely known, and in the Agrotæ alone will reach nearly 500 species. I know of more than 20 already that are different from any described in the monograph. Mr. Grote's earlier papers were, as a rule, careful and easy to work with, and so up to the period of Dr. Harvey's work. That Mr. Grote really described Dr. Harvey's species has been often told me; but it is interesting to have the statement from headquarters. Mr. Grote's work in the later period failed to equal the earlier papers, so far as value to the student is concerned, from the fact that he assumed in general that his readers knew the Noctuidæ just as well as he did himself. A brief indication, perfectly characteristic in Mr. Grote's view, was absolutely incomprehensible to one not so well grounded. Mr. Grote's work is essentially descriptive, rarely systematic, never monographic. His generalizations are often well put, interesting and valuable; but withal I have not found anywhere any "foundations" for monographic work that did not already exist in literature. Mr. Grote's correction of my reference to *insulsa* is just. I somehow overlooked the comparison to *repentis*. A specimen in Dr. Bethune's collection named by Walker, and agreeing with his description, is a species of *Hadena*, allied to *devastatrix* in maculation, but much darker and richer brown in colour, and is Mr. Grote's *H. ducta*. Walker's determinations are not reliable, and I do not say Mr. Grote is wrong.

JOHN B. SMITH.

NOTES.

WHOLESALE DESTRUCTION OF *COLIAS PHILODICE*.

In August, 1886, while visiting in Louisiana, Mo., I made frequent excursions to damp places along a neighboring brook in search of butterflies. It was the drougthy season, and there were but a few stagnant pools, damp gravel beds, and moist clay slopes at which insects could slake their thirst. At one of the last named places I noticed a great bunch of Coliads (mostly *Colias philodice* with an occasional *Eurytheme*), and a few specimens of *Pieris rapæ*, which my advance started and put to flight. As a few individuals did not take to wing, but seemed unable to rise though they fluttered violently, my curiosity was aroused and a closer investigation showed the bank and gravel bed below to be strewn with mutilated specimens of *Philodice*, scores of individuals, detached wings in some cases, in others the head and thorax remained intact. Upon taking the struggling butterflies by the wings I found they were held firmly to the ground, their abdomens being drawn into the burrows of Tiger-beetle larvæ. They were being actually eaten alive by these voracious grubs. I found that the robbers after eating the softer parts of the butterflies cast the wings and harder parts away from their holes. Upon my retiring a few yards the thirsty butterflies returned and settled down to sip the moisture again. Those that alighted over the burrows were quickly seized by their cunning enemies, and the poor creatures could only flutter, unnoticed in their death struggles by their unsuspecting companions. I found the clay slope to contain great numbers of these holes or burrows, and the top of each hole displayed a dark head with a pair of ugly jaws, murderous assassins in hiding, thirsting for innocent blood!

R. R. ROWLEY, Curryville, Mo.

ERRATA.—C. E., Vol. XXIII., p. 34, line 8 from bottom, and p. 36, line 4, for "Lec." read "Sec."; p. 34, last line, for *Prioma* read *Prionia*; p. 35, line 6, for "Lilia" read "Tilia"; p. 35, last line, for "Basidomycetons" read "Basidomycetous"; p. 36, line 15, for "Lilia" read "Tilia."

R. THAXTER.

* * * The Editor craves the indulgence of his correspondents, as he has met with a severe domestic affliction in the loss of his daughter, AGNES EMILY BETHUNE, who died on the 2nd of March in the twenty-second year of her age.

Mailed April 7th.

The Canadian Entomologist.

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No. 5.

SILVER-TOP IN GRASS AND THE INSECTS WHICH MAY PRODUCE IT.*

BY HERBERT OSBORN, AMES, IOWA.

The common affection of various grasses, commonly known as "Silver-top," has received the attention of such well-known investigators as Professors Comstock, Lintner, Forbes, Fletcher and others, and it is not with the expectation of completely solving the problem which has perplexed these careful students that I venture to present my experience, but in the hope that by comparisons of experience and observation we may arrive at a better knowledge of a subject at once important and complex.

The appearance of affected grass has been often stated and can be described briefly as a whitening of the upper portion of the stalk of grass, especially the head, which withers without maturing seed, while the basal portion is shrivelled. The causes assigned for this whitening have been various, but, I believe, generally referred to the injury produced by some kind of insect operating at the base of the terminal node of the stalk.

The various observations upon the insects suspected of causing the injury, or found associated with it, are admirably summed up by Mr. James Fletcher, Entomologist to the Dominion of Canada, in his report for 1888, pp. 59-62. Briefly, the species credited with the most certainty so far have been species of *Meromyza*, *Chlorops* and *Thrips*, while Mr. Fletcher mentions suspecting species of Hemiptera, and records an attempt to produce Silver-top by caging such Hemiptera (species not designated) upon grass plants.

The species which can perhaps be considered as having been most positively connected with the disease is a *Thrips* called *Limothrips poaphagus* by Prof. Comstock, and while, as will be shown later, I feel certain that but little if any of the trouble which has come under my

*Read before the Society for the Promotion of Agricultural Science, Indianapolis, August, 1890.

own observation can be due to this insect, I wish to state beforehand that I have no thought of discrediting Prof. Comstock's observations, or questioning the ability of the *Thrips* he describes to cause all the injury credited to it. It is evident, upon slight examination of the subject, that the same appearance of the grass may be produced by very different agents, provided they attack the same point in the stem. Any injury to the juicy base of the terminal node that cuts off the flow of the sap to the head during a certain stage of its growth must produce the withering and whitening so conspicuous in affected fields. Starting with this premise it is reasonable to conclude that the trouble *may* result from a number of different agents, and such, I believe, to be actually the case as a result from the sum of my observations here presented.

During the past two seasons I have examined with care a great number of affected stems, usually with the aid of a hand lens. For the season just past my observations in the field were interrupted, shortly after the appearance of Silver-top, by a trip to Washington. But while absent I had a graduate student collect as many of the whitened stalks as he could and place them in alcohol, and these have been examined also so as to make the observations extend through as much of the season as possible. In a very few cases I have seen evidence of fungi present in the shrivelled base of the withered node, but so very few and in such cases so evidently a consequent of the injury that I do not think it can be credited with any of the damage.

In a very small proportion of cases I have found *Thripidæ* present in the injured part, and in so few when the greatest care was taken to get stems that were but just beginning to show injury, that I feel forced to abandon the view that these are the principal agents in the injury here. Dipterous larvæ have been still less frequent and I feel positive that only an exceedingly small part of the damage for the region studied can be referred to them. Moreover, I think that in fully ninety per cent. of the stems examined (so many examinations have been made at odd times during my walks, and in spare moments, that no exact percentage can be given,) no insect of any kind was found to be within the sheath of the injured stem.

Punctures of insects have been noticed in great abundance on the parts of the plant around these injured parts, and in many cases evidence of the puncture of the succulent portion itself was apparent. The character of these punctures agreeing closely with those known to be

made by various species of Homoptera affecting the same plants, and the conclusion that these insects are responsible for a part at least of this injury seems to me to be very strongly suggested, though not demonstrated.

There is no question whatever that these Homoptera puncture grass, both blades and stems, to procure their food. This is shown by the numerous punctures and deadened spots on the leaves and stems, and can be verified by watching the insect itself. That the puncture of the stem just above the joint so as to enter the succulent base of the terminal node, and the extraction of the sap from that part, would cause their shrivelling and the consequent withering of the node above, seems sufficiently evident.

Knowing the habits of these insects, and considering the fact of their actual occurrence on the injured plants and the presence of injured spots, such as these insects make in getting their food, there seems to me no reasonable doubt of the *possibility* of these insects causing all the damage observed. The difficulty, in case we accept this view, is to explain why Silver-top is not more abundant than it is, or that such experiments as that by Mr. Fletcher in caging Hemiptera on grass did not produce it, for these insects swarm on almost every blade of grass. These insects, however, work on leaves and stems all the way from the surface of the ground to the tip, and their punctures are distributed promiscuously over all their surfaces. In stiff leaves and sheaths as well as in the stems above the succulent basal portion the shrivelling is confined to the few cells immediately surrounding the puncture, but in case the beak is thrust into the succulent part the effect is to kill the cells of an area through which all the sap for the nourishment of the upper node must pass, and, hence, the more conspicuous effect.

Some of my observations, moreover, show that this injury is not confined entirely to the upper joint, though always most conspicuous in the whitened head, but I have found the stem affected in lower nodes, and in some cases almost to the ground, in which cases also some of the upper leaves show the whitening effect of the injury.

The species of Homoptera most likely to be concerned in this work, are the common species of *Deltocephalus*, especially *inimicus debilis*, etc., which are serious grass pests, in any case, from their attacks upon the stems and leaves, and which I have recorded in some detail in a recent report to the Division of Entomology.

If correct in the opinion that the greater part of this injury where I have observed it is due to these insects, the matter of applications for their destruction becomes much easier, as we then have to deal with insects exposed to destructive liquids, or to destruction with "hopper dozers" and similar contrivances.

My argument in brief is this: "Silver-top" may be produced by a number of different insects—a point already made by Mr. Fletcher. It may result from the action of insects within the sheath, or from puncturing and sucking of sap by insects that operate from the outside. In my own observations but a very small percentage of affected stems have contained insects of any kind within the sheath, and many show clearly evidence of puncture from without.

The species most abundant in the affected fields, and known to puncture grasses, are mainly *Jassidæ*. These insects are sufficiently abundant, and their habits entirely in accord with the injuries noted. No other insects of sufficient abundance, and with habits to make it probable that they could cause the injury, have been found in the silver-topped grass.

I conclude, then, from all the observations made so far, that for the locality studied, Homoptera (mainly *Jassidæ*) are the principal causes of the disease. The insects are open to general attack, and Silver-top should be prevented by their destruction.

[The attention of Canadian observers is invited to this important subject. The appearance known as "Silver-top" has increased enormously in some districts during the last few years. In many cases examined the cause could not be ascertained.—Ed. C. E.]

SOME RARE LEPIDOPTERA TAKEN NEAR MONTREAL.

BY A. F. WINN, MONTREAL.

Thecla laeta, Edw. I was fortunate enough to take a female of this rare and beautiful butterfly on the top of Beloeil Mt., 22 miles east of Montreal, on May 24th, 1888. I again visited the place on the same date in 1889 and 1890, but on both occasions the weather was too cloudy for anything to be on the wing.

Thecla acadica, Edw. I took two specimens at St. Rose, July 7th, 1889, flying over a field of oats, among which there was a quantity of wild mustard in flower, and the butterflies visited the latter occasionally, but only for a moment, and then dashed off.

Thecla strigosa, Harr. Very rare some seasons, and rather common others. Flies in the beginning of July, and frequents the flowers of *Asclepias* and *Apocynum*.

Pamphila leonardus, Harr. One specimen (♀) taken on the flowers of Golden-rod, September 7th, 1890. The first I have taken.

Dilophonota ello, Linn. I have been given a specimen of this "visitor from the south," that was found in the grass on McGill College grounds about the end of September, 1886. This is an interesting capture, as the date agrees exactly with captures in Ontario at London, Hamilton, and Dundas, already recorded in the CANADIAN ENTOMOLOGIST.

Crocota Treatii, Grote. One specimen taken at rest on the trunk of an oak, July 6th, 1889.

Dryocampa rubicunda, Fabr. This is recorded as being very rare in this province (CAN. ENT. VI., 220; VII., 109); but since the introduction of electric lights in our streets a number have been taken every season.

Thyatira pudens, Guen. One specimen found at rest on a lamp post, May 13th, 1889.

Charadra deridens, Guen. I bred a specimen of this moth Feb. 21st, 1889. The larva was found on oak, and agreed exactly with the "unidentified larva" described in Vol. XVIII., p. 124 of the CAN. ENT. Last September I found two larvæ on white birch, but not having enough boxes with me to keep all the species of larvæ separate, I put a *Noto-donta* larva in the same box, and when I reached home I found that both my *deridens* had been bitten to death.

Syneda Alleni, Grote. Two specimens, 1889, one taken at Cote St. Antoine, flying at noon, June 30th; the other in the city, about the middle of July, by light.

Marmopteryx strigularia, Minot. I took this species in large numbers in a maple grove near St. Therese, on August 31st, 1890. They seemed to be confined to this place, as in the fields surrounding the wood none were seen, but as soon as the woods were entered they flew up from the trees by dozens to settle again a few yards off on other maple trunks. When at rest the wings were invariably closed over the back like those of a butterfly, showing the beautiful marbling of the under surface.

SOME INDIANA ACRIDIDÆ.

BY W. S. BLATCHLEY, TERRE HAUTE, INDIANA.

(Continued from page 81, Volume xxiii.)

22. MELANOPLUS FEMUR-RUBRUM, De Geer. The Red-legged Grass-hopper.

Acrydium femur-rubrum, Harris, Ins. Inj., 1862, 174, fig. 80.

Caloptenus femur-rubrum, Thos., Syn. Acrid. N. A., 1873, 163.

Id., Ninth Rep. St. Ent., Ill., 1880, 124,
figs. 22, 23.

Riley, Rep. U. S. Ent. Comm., I., 1877,
50, pl. II.

Melanoplus femur-rubrum, Scudd., Proceed. Bost. Soc. Nat. Hist.,
XIX., 1878, 284.

Our most abundant and injurious species found everywhere during the autumn months, but prefers open blue grass pastures and roadsides. Males and females of this species, as well as of the next, were taken in copulation as late as November 22. When disturbed it either hops vigorously to one side or flies swiftly and noiselessly straight ahead for about twenty feet and then suddenly drops to the ground.

23. MELANOPLUS ATLANIS, Riley. The Lesser Grasshopper.

Caloptenus atlantis, Riley, Rep. U.S. Ent. Comm., I., 1877, 49, pl. II.

Id., U. S. Agr. Rep., 1883, 172, pl. II.

Thomas, Ninth Rep. St. Ent., Ill., 1880, 124.

Melanoplus atlantis, Scudd., Proceed. Bost. Soc. Nat. Hist., XIX.,
1878, 285.

This species is fully half as common as *femur-rubrum*, and is found in company with it, the habits of the two being essentially the same. The notched apex of the last abdominal segment of the male of *atlantis* readily distinguishes that sex from the corresponding one of *femur-rubrum*, but the females are very similar and more difficult to separate. However, a little practice will enable one to distinguish them, even in the field, by colour characters alone, the abdominal sternites of *atlantis* being yellow, while those of *femur-rubrum* are dark reddish brown. Moreover, the upper outer surface of the posterior femora of the former are banded with three oblique yellowish bands, those of *femur-rubrum* being plain.

24. *MELANOPLUS COLLINUS*, Scudder.

Melanoplus collinus, Scudd., Proceed. Bost. Soc. Nat. Hist., XIX., 1878, 284.

Six males of the above species, which Mr. Scudder states has not been heretofore recorded as being found west of New England, were taken on Oct. 25, from shady places along the bed of the old Wabash and Erie Canal. I was not able to distinguish the females from those of *femur-rubrum* and *atlantis*, with which the ones taken were in company. The males are readily distinguished from those of *femur-rubrum*, which Indiana species they most closely resemble, by the following characters: The average size is less; wings shorter, not reaching tip of abdomen; elytra with fewer and smaller spots, and by *having the anal cerci forked at the tip*.

25. *MELANOPLUS DIFFERENTIALIS*, Thomas. The Lubberly Grasshopper.

Acridium differentialis, Thos., Trans. Ill. St. Agl. Soc., V., 1865, 450.

Caloptenus differentialis, Id., Syn. Acrid. N. A., 1873, 166.

Id., Ninth Rep. St. Ent., Ill., 1880, 127,
fig. 24.

A very common species along fence rows and borders of cultivated fields, especially in the Wabash river bottoms, where they feed upon the greater ragweed, *Ambrosia trifida*. On Oct. 2 hundreds were seen along the edge of a field of lowland corn, the leaves of the marginal rows of which they had almost wholly destroyed. When a stalk was approached, they did not desert it, but dodged quickly around to the opposite side, much as a squirrel does around the trunk of a tree when pursued. If, however, one took alarm and jumped, all the others in the immediate vicinity did likewise. The females of this species become exceedingly dark, sometimes almost black, with age, whereas the males are but little changed.

26. *MELANOPLUS BIVITTATUS*, Say. The Yellow-striped Grasshopper.

Acridium flavo-vittatum, Harris, Ins. Inj., 1862, 173.

Acridium bivittatum, Thos., Trans. Ill. St. Agl. Soc., V., 1865, 449.

Caloptenus bivittatus, Id., Syn. Acrid. N. A., 1873.

Id., Ninth Rep. St. Ent., Ill., 1880, 126.

Melanoplus femoratus, Scudd., Proceed. Bost. Soc. Nat. Hist., XIX., 1878, 284.

This usually abundant species is rather scarce in Vigo County. It frequents meadows, especially those of clover, and open pastures, and like *C. differentialis*, uses its wings but little in moving from place to place, relying upon its enormous leaps to carry it out of danger.

TETTIGINÆ.

27. *TETTIX ORNATA*, Say. Red-spotted Grouse Grasshopper.

Tettix ornata, Thos., Syn. Acrid. N. A., 1873, 183.

Tetrix dorsalis, Harr., Ins. Inj., 1862, 186.

Tetrix bilineata, Harr., loc. cit., 186.

Numerous specimens of this genus were taken which varied exceedingly in size and coloration, but which, under the present confused state of the literature at command, are all referred to the above species. They frequent the edges of dry, open woods, where they were quite common during the warm afternoons of October and November.

28. *BATRACHIDEA CRISTATA*, Harr. The Crested Grouse Grasshopper.

Batrachidea cristata, Thos., Syn. Acrid. N. A., 1873, 190.

Rare. Four or five specimens were found in company with the last named species. It is not mentioned in either of Thomas's Illinois lists, and I can find no record of it west of New England.

29. *TETTIGIDEA LATERALIS*, Say. Black-sided Grouse Grasshopper.

Tetrix lateralis, Harris, Ins. Inj., 1862, 187.

Tettigidea lateralis, Thomas, Syn. Acrid. N. A., 1873, 187.

Very common and variable in colour; frequenting the same localities as the last two species.

30. *TETTIGIDEA POLYMORPHA*, Burm. Small-winged Grouse Grasshopper.

Tettigidea polymorpha, Thomas, Syn. Acrid. N. A., 1873, 188.

Tetrix parvipennis, Harris, Ins. Inj., 1862, 187, fig. 82.

As common as the preceding, and found with it.

The Grouse Grasshoppers are the only *Acrididae* which, with us, hibernate in the perfect state. They have often been taken by the writer in midwinter from beneath logs and the bark of stumps, and on warm days in early spring they are very frequent on hillsides which have a southern slope. Dr. Harris well describes their movements when he says:—"They are extremely agile, and consequently very difficult to capture, for they leap to an astonishing distance, considering their small size, being moreover aided in this motion by their ample wings."

NOTE ON GRAPHIPHORA, HUBN.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

On page 92 of the Bulletin U. S. N. Museum, No. 28, Prof. Smith says: "Mr. Butler says *augur* is the type of *Graphiphora*, Ochs., in which case the application of the name to the *Taeniocampa* series by Mr. Grote would be unwarranted." I never fixed the type of Ochsenheimer's genus *Graphiphora*. What I did was to fix the type of Hübner's genus *Graphiphora* (see Check List, Part II., 1876, p. 37). Hübner proposes the name in the Tentamen for *gothica*, which, as it is the only species given, is therefore the type. Afterwards, in 1816, Ochsenheimer, 4, 68, includes *ravida* and 16 species not separable from *Agrotis*. Hubner's type, *gothica*, Ochsenheimer includes under *Episema*. By what process Mr. Butler assumes *augur* as the "type" of Ochsenheimer's genus is unknown to me. In any event Hübner's genus *Graphiphora* has precedence for *Taeniocampa* of Gueneé.

I may here also correct a misapprehension of Prof. Smith's with regard to the use of *vetusta* by Mr. Walker. On page 212, l. c., Prof. Smith says: "Mr. Grote has suggested that this (*i. e.*, *Agrotis vetusta*, Walk.) may be the same as *murænula*, G. & R., but this can scarcely be so if the description is at all to be relied upon." In reply I would say that I never suggested that *Agrotis vetusta*, Walk., was = *murænula*, but that *Mamestra vetusta*, Walk., might be that species (see Essay, p. 43.) It appears that Walker has two *vetustæ*, consequently Prof. Smith's apprehension that *murænula* may come to be discarded for either of them, proves groundless.

From an examination of Walker's type of *Mamestra insulsa* I came to the conclusion that it was probably an *Agrotis*. Prof. Smith says, Bulletin, p. 209: "Mr. Grote, whose reference of the species to *Agrotis* has been followed, gives no suggestion as to the species it most resembles, or where its allies are to be found." On page 43 of the Essay, where I make the reference, I say: "The specimen (from Canada) is evidently an *Agrotis*, allied to *Repentis*, and unknown to me."

ON THE OCCURRENCE OF TWO SPECIES OF COLEOPTERA
NEW TO MONTREAL.

BY J. F. HAUSEN, MCGILL COLLEGE, MONTREAL.

Platynus crenistriatus, Lec. I took a specimen of this interesting little beetle (fig. 1) here late in October, at the foot of a stump. It is not unlike in appearance certain small *Pterostichi*, but may be at once distinguished by having the elytral margin behind sinuate and simple, without the interruption and route fold usually seen in *Pterostichus*. It seems to me to be, in fact, one of those less specialized forms still exhibiting characters in common with some species of that genus. The form is convex, black and shining, with the elytral furrows deep and strongly punctured, feet and three basal joints of the antennæ bright yellow, the external margins of the elytra and edge of the prothorax



FIG. 1.

beneath piceo testaceous. Whether it is common elsewhere I know not, but it is the first specimen I have yet met with here. It seems of rather wide distribution, as the specimens from which Leconte originally drew up his description (New Species of Coleoptera, p. 9, 1863,) were obtained from Illinois.

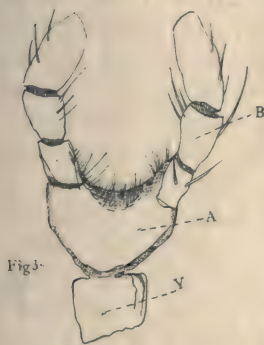
I took with this an example of another singular *Platynus* not usually found here, and which Dr. Leconte has replaced under the old name under which it was described, namely, *Anchus pusillus*, Lec. Specimens are also in my collection from St. Jérôme, P. Q., and Northern Vermont.

Some time since I was handed, for identification, by one of the members, a little



FIG. 2.

longicorn I did not at first know, but which on closer examination proves to be a specimen of *Gracilia minuta*, Fab. (Fig. 2.) My friend, Mr. Caulfield, who has very kindly placed all his specimens in my hands, states it was taken emerging from a barrel of some kind of dye, and it is probably introduced from Southern Europe. Superficially it resembles somewhat one of the *clytini* and, in fact, Schiödte placed it immediately after *clytus*. (Class. Cramb. Dan. Faun., Natur. Hist. Tidsskrift, 1864, S. 3. V. 2, p. 483.) But the slightly depressed elytra, corneous ligula, not finely granulate eyes, etc., would point to its being perhaps more properly placed in *Æme* of *cerambicini*. For the benefit of those who may not know it, and especially as it does not appear, so far as I am aware, to have been before recorded from Canada, it may be well briefly to describe it.

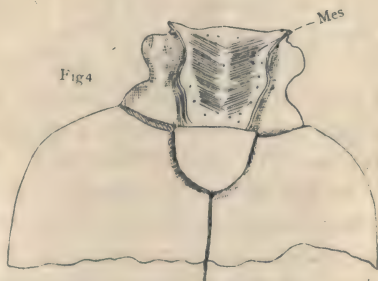


Fab. = *pygmæa*, Fab. = *fusca*, Hald.

Fig. 3 represents the labium (A) the ligula and paraglossæ being in this case confused and indistinct; B lateral palpi; Y basal membrane of labium.

Fig. 4 shows the mesonotum which is large, glabrous, margined at sides and covered with stridulating surface consisting of extremely fine transverse lines.

The figure (2) it is hoped will convey some idea of its general form. It is of a uniform reddish brown, the legs being somewhat lighter, with rather sparse cinereous pubescence giving it a hoary appearance. The antennæ are ciliate and the head, thorax and elytra furnished with flying hairs. Rather variable in size, .18-.27 in. Leconte states (Jour. Acad. Nat. Sc. Phila., 1850, pt. 1, p. 24) he could find no difference between his specimen and those from Europe. As somebody may have it under a different name, I will give the synonyms: *G. minuta*,



LIMENITIS ARTHEMIS, ETC.

BY JOHN B. SMITH, NEW BRUNSWICK, N. J.

The paper by Mr. W. H. Edwards in the March number of the CANADIAN ENTOMOLOGIST brought back to me vividly my collecting days in the Catskills, and as I have also taken *arthemis*, *proserpina* and *ursula*, perhaps my experiences may not be entirely uninteresting. It was sixteen years ago that I set out for a two weeks' tramp in the mountains, and as it was my first experience with them, the memory of that trip is yet more distinct than of many subsequent excursions. I arrived at Catskill village soon after sunrise, and before noon was close to the foot of the mountain. I saw more butterflies there than I had ever seen at any one time before, and gathered in a large harvest, of *Argynnis* more especially. *Limenitis ursula* was abundant, but as this was already an old acquaintance, I captured only such as offered themselves too temptingly. My objective point for that day was the Mountain House on the summit, and soon after I started the climb I noticed that *ursula* became smaller, and had an odd look somehow. I took a few, and above the Rip Van Winkle House began to take *arthemis*, and saw no more *ursula*. I stopped at the Rip Van Winkle, deeming it a good collecting centre, and stayed there a week. On the second day a colony of ants invaded my room, and before I discovered them, destroyed a large part of my first day's collecting. I threw away all the *ursula*, but saved some of the odd-looking specimens which had suffered little, and these proved *proserpina*. I took *arthemis* on the top of the mountain, but no more *proserpina*. Had I known the insect, I could no doubt have captured many, lower down the road, but I never tramped that way. In five different, not consecutive years thereafter, I visited the Catskills, but made Lexington, only a few miles—six, I believe—west of Hunter, my stopping place. This is about 2,000 feet above sea level, though lower than Hunter. To reach it from the U. & D. R. R. meant a 13 mile drive from Shandaken through the "notch," which is nearly a duplicate of Stony Clove. In this "notch," which I often visited, I took many a good insect, and it was a reliable locality for *arthemis*. They were very abundant always, though rather shy; but I never found *proserpina* during the five years I collected there. But on the other hand I took *ursula* on both sides of the pass, both at Shandaken and at Westkill, and along the banks of the Schoharie at Lexington. There is no doubt, therefore, that

ursula gets within a very few miles of Hunter, and that to reach Stony Clove it would not be necessary for it to come from the Hudson Valley. There are no natural obstacles to prevent a direct flight over the Schoharie to Hunter. Through Stony Clove I have been only once, and that by rail on my last visit to the mountains, when I did no collecting.

As to the standing of *proserpina* I have no opinion to offer.

Mr. Edwards, on p. 55 in the note, makes some remarks on the value of genitalia in determining species. On this point I have very decided opinions. By his suggestion that "some seem to have shrunk in the drying, others perhaps are done from the green subjects, and are full and plump," Mr. Edwards shows that he has never looked into the matter himself at all, else he would know that the structures are chitinous and cannot shrink any more than the antennæ, palpi or legs. The preparation from the recent specimen, and that from one fifty years old, would be alike in the same species. Do the parts vary? Decidedly no, or to so slight an extent as to be scarcely appreciable. I have examined dozens of specimens of some of our common noctuids, and found no variation, however much the maculation differed. In my study of the *Lachnosterna* many hundreds were examined, some specimens a dozen years old, others just killed, and the correspondence was absolute. Do they help us distinguish species? Also, decidedly yes. But this needs qualification. Identity of sexual structure does not necessarily mean identity of species; but on the other hand, difference in sexual structure *always* means difference of species. I have found these structures of the utmost value in the *noctuidæ*, and in some genera that I have studied would not hesitate to determine species from the genitalia alone. In *Lachnosterna* I would agree to name any species of either sex from the genital structures where it is one of the species I have figured.

But Mr. Edwards is right in one respect. Sometimes the character fails, and in an entire genus all the species will be practically alike. My revision of *Agrotis* illustrates that most strikingly. In this, however, the character shares with many another the burden of want of universal application, and we must use it as far as it goes. In the noctuids it is most valuable in separating closely allied species, and it often determines for me the rank of a form when the other characters leave me in doubt. I believe that all who have carefully studied these characters are convinced of their importance and high value in specific separation.

NOTES ON THE LIFE HISTORY OF *ECPANTHERIA*
SCRIBONIA, STOLL.

BY HARRISON G. DYAR.

The preparatory stages of this species do not seem to have been described. Mr. Hy. Edwards in his catalogue gives eleven references, but in none is the egg mentioned, or any but a single larval stage, and in only one the pupa. It will, therefore, not be amiss to briefly describe the several stages here. I would like first to call attention to the remarkable fertility of the insect in question, at least in Southern Florida where I met with it. In *Psyche*, Vol. III., p. 364, Mr. Krancher cites an example of an European moth *Lasiocampa quercifolia*, that laid 580 eggs, and seems to consider this an unusual number, as it doubtless is; but my example of *Ecpantheria scribonia* laid nearly four times as many.

The moth was bred from a larva found at Palm Beach on Lake Worth, Florida, and emerged from pupa Feb. 4, 1890. As it was a female and crippled, the wings having failed to develop properly, I tied it out over night and the next morning found it mated with a male of the variety *denudata*, Slosson. On the evening of Feb. 6 it began to deposit eggs on the sides of the box in which it was confined, and during the night laid about 400 eggs. Every night after this it laid eggs till the night 10-11 February, after which it died. The total number was 2,274 as nearly as I could count them.

Egg: Nearly spherical, the base a little flattened, all minutely punctured; colour yellowish pearly gray; diameter .8 mm. Duration of this stage about five days.

First stage: Head light brown, paler in front; ocelli large, black; width .5 mm. Body pale whitish, except the first and central abdominal segments (joints 5, 6, 9, 10 and 11) which are light brown. The warts are arranged as usual in the *Arctiidae*,* concolorous, the bristles black. Length about .2 mm. Duration of the stage four days.

Second stage: Head nearly colourless, shining, tinged with brown; ocelli large, black; mouth parts brown; width .7 mm. Body nearly concolorous with the head, not shining, tinged with reddish brown. The warts of rows (1) and (2) (the trapezoidal warts) on joints 5, 6 and 9-11

*As in *Arctia*, *Leucarctia*, *Spilosoma*, *Hyphantria*, *Arachnis*, etc, but not as in *Halimodota*.

black ; hair black. Later the body becomes more brownish, blackish around the black warts and a pale dorsal line is seen. This stage lasted four days.

Third stage : Head semi-transparent, pale brownish ; a darker shade at the vertex ; maxillæ reddish ; ocelli black ; width .9 mm. ; cervical shield and legs black ; body light reddish brown except the dorsal warts on joint 4, joints 5 and 6 entirely, and joints 8, 9, 10 and 11 in the subdorsal space, which are black ; a white dorsal line ; bristles spiny and sharp, black. Duration of the stage six days.

Fourth stage : Head shining pale brownish ; the mouth parts paler ; ocelli black ; width 1.4 mm. Body reddish orange with a slightly paler dorsal line ; joints 5, 6 and 9-11 are black, the latter in the subdorsal space only, and most of the warts are black. The length of the larva is about 10 mm. Duration of the stage six days.

Fifth stage : The markings of the mature larva are now assumed. Head brown, blackish in front ; ocelli and inside part of the jaws black ; labrum and antennæ pinkish ; width 2 mm. The body is marked as in the mature larva, black with transverse vermilion bands, except that there is a faint pale dorsal line anteriorly.

Sixth stage : As in the preceding stage. The width of the head is 2.8 mm. and the dorsal line is reduced to a mere trace. Feet reddish and spiracles ochre.

Seventh stage : Head irregularly black in front, brownish at the sides and vertex ; mouth parts and antennæ reddish ; width 4 mm. Body as in the mature larva, except that the transverse bands are lighter red. Length of larva 45-60 mm. Duration of the stage nine days.

Eighth stage : Head brownish black with a pale line in the suture at vertex and a pale spot on the side posteriorly ; labrum and antennæ salmon colour ; jaws brown ; width 5.3 mm. Cervical shield straight in front, curved behind, bisected by a pale line ; body velvety black except a transverse vermilion band on each segment in the intersegmental incisures on joints 5-11 inclusive, concealed when the body is contracted. Thoracic feet brownish red, abdominal feet brown, the lower part salmon colour and the claspers whitish ; spiracles dark orange ; bristles spiny and sharp, black. Length of larva 85-95 mm. at maturity. Duration of this, the last stage, eleven days.

Cocoon: A thin netting of yellowish silk just as in *Arachnis picta*. The drops at the joinings of the threads are yellow like little amber beads.

Pupa: Robust, of normal shape; on the abdominal segments, dorsally and subventrally are ten rows of large tufts of short spiny hairs, the tufts smaller ventrally and less numerous posteriorly; cremaster, two tufts of reddish spines from elevated bases. Colour black, reddish in the abdominal incisures; the body is smooth and dull, the wing cases more shiny, creased. Spiracles linear, reddish. Length 35 mm., width 13 mm. Duration of this stage twenty-eight days.

Food plants: The larvæ run about on the ground or ascend shrubs or small trees and eat whatever comes in their way, if it is not too coarse. My specimens were fed principally on a species of Spurge (*Euphorbia cyathophora*) and Castor-Bean (*Ricinus communis*).

ENTOMOLOGICAL SOCIETY OF ONTARIO.

THE GEOLOGICAL SECTION of the Society was formed in May of last year, and at the Annual Meeting in August was regularly constituted a branch of the Society. The members are as follows:—Dr. S. Woolverton, President; Thos. Green, Vice-President; J. L. Goodburne, Secretary; and Messrs. B. Green, W. J. Carson, Alex. Marshall, W. Percival, Geo. Burrell and M. Scarrow. The course of study taken up was Sir Charles Lyell's work, which proved of much interest and benefit. Discussion sometimes waxed exceedingly warm, exception being taken to many of the positions erected by various writers; this, however, had a good result, as the discussions caused the subject-matter to be well understood by all. Specimens obtained in the district about London were exhibited at the meeting, and much patient research was sometimes necessary in order to identify examples of obscure fossils, not, however, without a few mistakes, which in the main were subsequently set right.

The members had regular excursions, Friday and Saturday of each week being generally devoted to this—probably the most interesting part of geological study, and not a week passed without some new specimens being placed upon the tables of the entomological rooms. The district around London was well worked up, especially in the vicinity of Springbank. In addition to this trips were made to St. Marys and Arkona, many specimens being brought home from both places.

Taken altogether the year's work has been very satisfactory to the members and interest has not flagged at any time, each member seeming anxious to do what he could towards adding to the interest.

MEETING OF THE LONDON ORNITHOLOGICAL SECTION.—The March meeting of this section was held on the evening of March 2nd, in the rooms of the Entomological Society. After routine business, the monthly list of species observed was taken up resulting in the addition of the following ten species for February, with a total of seventeen species observed during the month:—Goldfinch, Robin, Bufflehead, Great Horned Owl, Great Northern Shrike, Song Sparrow, Bluebird, Junco, White-winged Crossbill, Mottled Owl. The chairman reported that a specimen of the Great Carolina Wren had been received by one of our members, Mr. L. H. Smith, from Forest. This is the first record of its occurrence in Canada. Mr. Stevenson remarked on the abundance of the Snowy Owl in this vicinity during the present winter, about eight or ten having been heard of by members of this section, all seen or taken in the county of Middlesex. The chairman reported the capture of a Bohemian Waxwing in September, 1890, by Mr. Harry Gould, while feeding in a wild cherry tree in company with some Cedarbirds. This appears to be the first record of its occurrence since about 1878, when Mr. W. Hines captured a few in the city in midwinter.

CORRESPONDENCE.

HALISIDOTA TRIGONA.

Dear Sir,—In reply to Mr. Dyar's note on p. 43, I would say that I compared my type with Herrich-Schæffer's figure of *specularis* from Brazil, and arrived at the conclusion that the two closely allied forms were distinct species. In one of my papers (Tr. Kans. Ac. Sci., p. 65,) I gave the differences observed: "Closely resembles the Brazilian *specularis*, H.-S., fig. 59. It differs by the smaller size of the vitreous spot, the outer edge of which is farther from the external margin and more even. The Brazilian species wants the yellow terminal shade line (from the figure). There is a great resemblance between the two widely geographically separated forms." Mr. Dyar says: "I have compared Mr. Grote's description with H.-S. figure, and there is no doubt but that the two refer to the same insect." The "doubt" I have grounded as

above cited, and, without further evidence than appears, Mr. Dyar's synonymical note is not justified. It is at least previous to the necessary comparison of Brazilian and North American material. Probably our species is distinct, as there are other cases of allied but distinct North American and Brazilian moths, such as *Hepialus auratus* and our common *Orthodes* recently separated by Mr. Butler from the Brazilian *infirmus*.

A. R. GROTE.

NOTES.

ATTRACTING BUTTERFLIES IN COLORADO.

I had generally considered *Papilio indra* to be a rare insect in Colorado, and from the inquiries of correspondents would think it wanting in many collections. While collecting at about 7,000 feet elevation, in June, '89, I occasionally saw one go past me like a flash up the mountain sides; but one sultry afternoon I took several examples in a narrow canon as they sat upon a small piece of sandy ground that had been soaked by a thunder storm in the morning. I acted on the hint thus given, and kept the place well moistened with water from the creek near by, and visited it frequently during the week I was in the vicinity, with the following result:—

Papilio indra, 65 examples.

P. zolicaon, 1.

P. eurymedon, 3.

P. daunus, 10.

Anthocharis olympia, 5.

Argynnis edwardsii, 2.

A. halcyone, 5.

Chionobas uhleri, 4.

Lemonias nais, common.

Nisoniades tatus, 3,

and several common species in abundance. The "Section Boss" of the railroad used to go past frequently, and he got quite interested with my pursuit. I remarked to him one day, I thought it odd I did not attract butterflies on the other places I watered. He said: "Well, it does seem kind o' queer, and I buried a mule in that very spot last fall."

DAVID BRUCE, Brockport, N. Y.

SOME OBSERVATIONS ON THE COLLECTING OF 1890.

A combination of causes prevented me from doing my usual amount of hunting around Hamilton last summer, and the reports of the collectors there left with me the impression that I was not losing much. I took many a stroll through the city, looking for, and expecting to find something, but invariably returned disappointed.

I suspect that electric lights and sparrows are working a revolution in city collecting. I was informed by a collector, whose duty takes him out early in the morning, that unless he got to a light that was in close proximity to his work before the sparrows, he got nothing; that they know the location of all the lights as exactly as the City Engineer, and when they have cleaned up one, they make straight for another; and they are not content to take merely what is on the ground, but will flutter up and down the pole, and pick off what is at rest on it; or perched on top of a fence, they will survey carefully all below them, and the instant they see an insect, they drop to a level with it, pick it off, and mount the fence again to devour it.

The communications from other parts of the country, which I have received since the season closed, indicate a general disappointment with the result of the collectors' labours.

On the 7th of June I went on a visit to the country, about sixteen miles south of the city, staying to the 23rd. The weather was warm—the first steady heat of the season. There was a bit of open woods close at hand, to which I was a constant visitor, and found hunting there specially interesting and profitable, a goodly number of different Lepidoptera almost daily emerging.

Edema albifrons was in surprising numbers. Look in any direction, and the eye would light on several of them sitting in their own peculiar attitude when at rest, the wings rolled tightly round the body, the front legs straightened out beneath them, supporting the forward part of the insect at an angle to the object it rests on, the lime-grey colour of its wings, and the light coloured, brown margined, singularly truncated head end, giving it an exact resemblance to a bit of rotten twig sticking out from the side of a tree.

Another plentiful thing was *Heterocampa guttivitta*; what most drew my attention to this insect at this time, was the large proportion of deformed ones. We are often disappointed in rearing insects in confinement, by having some of them deformed, and are apt to attribute the deformity

to the confinement ; but this species in nature gave a larger proportion of deformed specimens than I ever got from all my rearing in confinement. *Lunas* were very abundant. I took one dozen, and could have taken three. I found several of them in a badly crippled condition, one particularly so ; on one side the wings were perfect, on the other they had not expanded one iota, they did not even look as large as they should have been when it burst the chrysalis.

I saw *Lunas* flying for the first time in my life. They mount easily and make good progress, but the operation is performed wholly by the front wings ; the tails were crossed, and in one instance I felt certain the curves were linked into each other, giving firmness and immobility to the hind wings. I took a pair of *Packardia geminata* in coitu ; the singular form of the object arrested my attention, without suspecting it was produced by insects. The sexes differ greatly, in both size and markings. It has been an extremely rare insect in my experience, having never seen the male before, so I was much pleased with my find.

I took my first specimen of *Datana angusii*, and a single specimen of a *Datana* of the *ministra* type, but with only three lines across the wings, wavy and comparatively even.

I also made my first capture of *Halisidota maculata*, although *Caryæ* and *Tessellata* are amongst the most constant and plentiful species in the Hamilton neighborhood. On the field day of our Society during its annual meeting in August last, I took a *Tussock* larva on bass wood that attracted my attention by its bright lemon yellow colour, and square black spots down the centre of its back. Not knowing it I showed it to Mr. Fletcher, and he pronounced it to be *H. maculata*. During September they were quite abundant on the maple shade trees about London.

During that June visit I took an *Azelina hubnerata*, which has been in my experience a very rare and variable geometer. I am aware that some of the forms that I have taken may have distinguishing names, but I have not had them authoritatively determined. I also took five specimens of *Dryocampa rubicunda*, my first captures of that attractive moth, several *Tortrixes* and other small moths new to me, which have not yet been identified, and a variety of good but not uncommon moths besides ; also two males and six females of that delicate long-sting Hymenopter *Arotes amœnus*, Cress., making altogether a very satisfactory two weeks' collecting.

I made another visit between the 18th of July and the 2nd of August, to a locality 25 miles north of the city, but got nothing worthy of notice, except, perhaps, a *Catocala relictæ*, for its being somewhat early in the season. In London during November *Operophtera boreata* was very plentiful, yet I did not see a single specimen of an *Anisopteryx*.

J. ALSTON MOFFAT.

VANESSA CALIFORNICA IN VANCOUVER ISLAND.

Noticing the remarks of Mr. W. G. Wright in the February number of the CANADIAN ENTOMOLOGIST respecting *V. Californica*, I considered it would be of interest to give particulars of its capture at Victoria, B. C. During 1890 it was scarce in this vicinity, though probably common enough on higher elevations. The specimens taken by me were captured at Beacon Hill, amongst or near the fir trees that compose the wooded part of the Park, and situate some sixty feet above the sea level. I secured my first as it was rapidly flying along a new made road, which runs through the firs; this was on September 9th. The next time I saw it was September 21st, when I managed after a long run to net a worn-out specimen. A whole month intervened before seeing it again, the third one being captured October 26th. This was the last, and was taken off a fir tree whilst sucking the sap, apparently too satiated with the juice to heed danger, being easily taken, and transferred to my collecting box. It was a good specimen as regards plumage, but ragged and torn, having evidently been "on the road" a long time. Mr. James Fletcher, of Ottawa, kindly named it for me, at same time mentioning that it was the first recorded capture from Vancouver Island, if not in Canada.

I doubt very much if those taken by me were bred here, but hold more to the idea that they were visitors from foreign parts across the Sound, or perhaps from the northern part of the island. Mr. W. G. Wright says:—"It is of no value itself; it is usually present when you don't want it, and its appearance seems to be the signal for more interesting species to disappear." This without doubt is true as regards California, its natural home; but considering all things, I certainly believe that its appearance on Vancouver Island is of value, even if it does nothing more than add another species to the list of diurnals occurring here, and I fondly hope to see it again this year.

W. H. DANBY.

Victoria, B. C., Feb. 21st, 1891.

CANADIAN RHYNCOPTERA.

Since writing the notes on Rhyncophora which appeared in the February issue, I have had an opportunity of obtaining Dr. Sharp's determination of the two species mentioned on pages 22 and 23. He writes to me as follows:—"The two weevils from Cape Breton are: 1. *Otiorynchus rugifrons*, Gyll., 2. *Sciaphilus muricatus*, both common N. European insects. The *Otiorynchus* is a slight var.; the *Sciaphilus* not distinguishable from Scottish specimens." W. H. HARRINGTON.

ARCTIA ARIZONENSIS, STRETCH.

I obtained eggs from a worn ♀ taken at light near Salt Lake City, Utah, in June; these gave me a fine lot of imagines early in September, and I again got eggs from them, and had larvæ feeding which produced a number of moths at various times during the winter. Some of the larvæ ceased to feed when one-third grown, and I dumped them out among weeds by my orchard fence to take their chances. From the two broods I got about 150 fine examples of the perfect insect. Part of the first lot were fed up by a friend in Ogden, Utah, and sent to me as pupæ, part were fed in Denver City, and many I reared in the mountains above Platte Canon (10,000 feet elevation). The last brood were reared in Western New York. The larvæ were very easy to manage and ate freely of almost anything. Plum, willow, plantain, polygonum, lettuce and chickweed were given them as best and easiest obtainable, but nothing seemed to come amiss. Under the different conditions of altitude, climate and food I ought to have obtained varieties, if the species varies at all, but I never bred any *Arctians* that kept so constant to the parent form. I also have about a dozen of both sexes taken at light in Utah and Central Colorado, and these also are the counterparts of my bred examples. All the males are precisely like Stretch's figure of *Arizonensis* ♂, the ♀♀ exactly like his *Autholea* ♀, in the same work (Zyg. and Bomb.), but not one male was like his *Autholea* ♂ as there figured, but all well spotted on underwings like his figure of *Arizonensis* ♂. I give description of the mature larva (the earlier stages were plain black):--Head and thoracic feet shining black with tinges of chestnut; body velvety black with narrow reddish brown dorsal line (produced by two linear spots on each segment). all tubercles intensely black, those above lateral fold all crowned with bunches of short black hairs; those on second and

third segments have many light brown hairs intermixed; the bunches below lateral fold are light brown, thus giving the larva the appearance of being fringed; body beneath and abdominal legs light purplish brown. Length, two inches. Pupa black, covered with white powdery bloom. The eggs were very numerous and small and light yellow in colour. The hairs of the larva possess stinging properties, and are very irritating to the bare arms and face, as I experienced to my great annoyance on several occasions.

DAVID BRUCE, Brockport, N. Y.

PLATYNUS NEW TO CANADA.

Among the commoner beetles at Sydney, Cape Breton, if not indeed the most abundant, is a species which has, I think, not been recorded in Canadian lists. I refer to *Platynus hardyi* which was described by Leconte (Bull. Brooklyn Ent. Soc. Vol. II., p. 53) from Newfoundland specimens received by him from Baron de Chaudoir. I cannot find any record of it from other localities. The specimens which I collected in 1884 were not carefully examined and were placed with *P. cupripennis*, of which a few examples were collected at the same time. On looking over the lot last winter I found that they were undoubtedly *P. hardyi*, and last September I captured a nice series. The species is eminently gregarious, and when a good locality is found they may be seen in numbers under boards or loose stones, but the colonies scatter so rapidly that the majority escape. Whether this beetle is distributed through, and indigenous to the island, or has been brought over from Newfoundland in one of the numerous steamers that carry coal from Sydney and return in ballast, I cannot say.

W. H. HARRINGTON.

BOOK NOTICE.

MANUAL OF ANIMALS INJURIOUS AND BENEFICIAL TO AGRICULTURE.

Dr. J. Ritzema Bos, lecturer at the Agricultural College of Wageningen, Holland, has just published a magnificent volume in German which makes one wish English-speaking farmers and gardeners, as well as entomologists, possessed in their own language, and for their respective countries, a similar compendium of knowledge on the "Animals injurious and beneficial to agriculture, cattle breeding, forestry and horticulture." (*Tierische Schädlinge und Nützlinge*, Berlin, 1891.)

This work of 876 pages contains all the information necessary concerning the forms, occurrences, life history in relation with man of his various animal friends and foes, and the curative and preventative measures against their attacks. The newest discoveries of workers in this field, and original researches by the author are recorded, and 477 figures, engraved with scientific accuracy, show the appearance of the different mammals, birds, insects, snails, and worms, the details of their structure, and many devices for resisting the injurious kinds or assisting those that war against the latter and are thus precious allies of the farmer and gardener.

The first 30 pages are devoted to considerations on the causes of occurrence of obnoxious animals, and on the general means of protection against them. Then 80 pages treat of mammals from the bear to the mouse and the bat, 120 of birds, 460 of insects, 130 of snails and worms. The depredations of insects, which have been particularly studied by Dr. Bos, are especially dwelt upon.

At the end of the book are tables of the animal pests arranged according to the place where they live. This table is most useful, for, with its aid, anyone who has found any form of animal life preying on man, cattle, domestic animal, tree, or plant, or in granary, barn, or house, and wishes to know its name, habits, the nature of its ravages, the remedies against it, etc., can with very little trouble find the page in the volume where the desired information is given.

For instance, the first item of this table is as follows, with reference for each animal to the page in the book :—

BEE, BEE HIVE :—Foxes, marten, polecat, bear, honey-buzzard, tits, occasionally other bird species ;—spiders ;—wasps ;—the brown bee louse (*Braula cæca*, a winged louse) ;—the so-called black bee louse (larva of an oil beetle), which, however, leads usually its cuckoo life only in wild bees' nests ;—bee moths, wax moths ; bee-beetles ;—earwigs.

Similar lists follow for cat, cattle, dog, domestic birds and eggs, goat, horse, man, pig, rabbit, sheep.

The references to apple tree pests are arranged under the different heads : In roots, in wood, under bark, in bark crevices, on and in buds, on young shoots, on one year's twigs, on buds and leaves, in the fruit, ravagers of the fruit ; and similarly for all common trees and plants of field, garden, or forest.

J. A. GUIGNARD, Ottawa.

The Canadian Entomologist.

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No. 6.

NOTES ON SOME SPECIES OF NOCTUIDÆ DESCRIBED BY FRANCIS WALKER.

BY PROF. JOHN B. SMITH, NEW BRUNSWICK, N. J.

In Vol. XXXII. and XXXIII. of the list of Lepidoptera Heterocera in the British Museum, Mr. Walker described some species from "West Canada, in the Rev. Mr. Bethune's collection." No records of specimens in the Museum are given, and the descriptions are of specimens apparently returned to the collector. On the chance of these specimens being still in existence I wrote Dr. Bethune, begging him for such assistance and information as was in his power to afford. He very kindly responded, saying, "I shall send you by mail to-morrow a box containing the few specimens that I have left that were named for me by the late F. Walker. The labels on them are mostly in his own hand-writing. When I came here in 1870 I had no room for my cabinet and was obliged to store it away in a dark place for some years. I was also so very hard worked, building up this school, etc., that I was unable even to look at my specimens. Consequently the *Dermestes* got in and destroyed a large number—especially those set low down—that were my first captures, and that Walker had named. Thus many of his types had perished. I do not think it matters very much, as the descriptions and identifications were often so unsatisfactory. After seeing what I send you, you might *abolish* all the others that are stated to be in my collection, because they are no longer in existence and cannot be identified."

The box came duly to hand, and as the specimens gave rise to some doubt, and I desired to fully establish the value of the labels, I again wrote Dr. Bethune, and he replied :

"I have been unable to find any more records regarding my 'Walker insects.' The *printed* labels and numbers on those I sent you were put on by myself—the *written* ones are Walker's. It is of course quite possible that some of them got transposed, as they have been changed from one cabinet to another, and had also to go through a severe disinfecting

process to get rid of the *Dermestes*. This has no doubt happened in the case of the specimen marked *Agrotis ordinata* that you refer to.

"Where the specimen agrees with Walker's printed description, it is either a type or corresponds closely to his type—perhaps examined at, or nearly at the same time. * * * My first acquaintance with Walker was in 1863 when I spent some time in London. I was in England during the greater part of '63 and '64. I used frequently to go to the Brit. Museum, and struck up a great friendship with W., which continued to his death. We corresponded regularly, and he sent me his publications and quantities of European and other insects, for which I made the best return I could. He was one of the quietest and gentlest of men; his sensitive nature was much pained by some of the harsh and rough criticisms that were passed upon his work. His mistake was in attempting too much. Had he confined himself to the Diptera, his reputation would probably never have been impaired."

At my request Dr. Bethune kindly gave me permission to deposit these specimens in the U. S. National Museum at Washington when I had examined them, and there they now are, accessible to all students who may desire to verify my conclusions.

Nine species only are described by Walker as "In Rev. Mr. Bethune's collection," but a number of others are given as from West Canada, and sometimes they are said to come from Mr. Bethune.

Of these nine species eight are represented in the specimens before me, one only, *Agrotis vetusta*, is wanting. With the exception of the specimen labelled "*Agrotis ordinata*," all are evidently the types, agreeing in sex and in all other points with the description. In *Agrotis ordinata* I cannot accept the labelled specimen as type, though it agrees in at least one important feature—the sex.

The few specimens which are not types, are in many instances erroneously named—provided that the species we know under Walker's names are really his species.

In detail the specimens before me are as follows:—

Mamestra insulsa, Walk., C. B. M., Lep. Het. IX., 234, 1856.

An imperfect specimen; but not the type. It is *Hadena ducta*, Grt., (Bull. U. S. Geol. Surv., IV., 176, 1878). The type is in the British Museum and has been examined by Mr. Grote who said first it was an *Hadena*, and afterwards that it was an *Agrotis* allied to *repentis* (*Carnades messoria*). Walker's description applies perfectly to the specimen

before me, and does not apply well to any form of *messoria* known to me. As the type is in existence, the best way will be to cite *insulsa*, Wlk., as a questionable synonym of *ducta*, Grt., and thus call the attention of whoever may have a chance to make the comparisons to the probabilities. The species was described from Orillia, West Canada, and the locality is therefore in favor of the name.

Mamestra dispiciens, Wlk., C. B. M., Lep. Het., XXXII., 660, 1865.

The specimen is labelled by Walker, and is evidently the type. It is a normally marked *Carneades messoria*.

Mamestra unicolor, Wlk., C. B. M., Lep.-Het., IX., 233, 1856.

Determined by Walker, but not the type. It is *Noctua clandestina*, Harris, and therefore agrees with the type, which Messrs. Grote and Robinson have also identified with *clandestina*.

Mamestra nigriceps, Wlk., C. B. M., Lep. Het., XXXII., 659, 1865.

Apparently the type, agreeing well with the description, but without Walker's written label. A printed label has been substituted for the original, if a written one ever existed.

This species is also equal to *Noctua clandestina*, Harr. It was described as in Dr. Bethune's collection.

Mamestra contenta, Wlk., C. B. M., Lep. Het., IX., 232, 1856.

A badly rubbed specimen, but easily recognizable as *Hadena devastatrix*, Brace, and therefore like the type which Mr. Grote has referred in the same way.

Agrotis reticens, Wlk., C. B. M., Lep. Het., XXXII., 692, 1865.

Two specimens, one with Walker's written label, the other with a printed "Type" label and a printed specific label. Both specimens are *Carneades messoria*, Harris.

Agrotis ordinata, Wlk., C. B. M., Lep. Het., XXXII., 691, 1865.

The specimen bears Walker's written label, and is described as in Dr. Bethune's collection; but it does not at all agree with the description. Neither does it agree with the description of any other of the species described from Dr. Bethune's collection. The specimen is *Pyrophila tragopogonis*, Linn., and I can only imagine that Walker in placing his labels, placed this one on the wrong specimen, or that in the transferring in Dr. Bethune's collection, another specimen became substituted for the type. What is described is really a form of *Carneades messoria*, Harr., to which I would cite *ordinata* as a synonym.

Agrotis vetusta, Wlk., C. B. M., Lep. Het. XXXII., 691, 1865.

This species is not represented in the material sent, and I am entirely unable to apply the description to any form known to me, either in the *agrotids* or in the *noctuids* as a whole. According to Dr. Bethune's statements the type, mentioned by Walker as in his collection, has no present existence, and as the description cannot be satisfactorily applied, the name must drop. I have reprinted the description in my Revision of the *Agrotids*, p. 212.

Walker has described under the specific name *vetusta* an *Agrotis*, a *Mamestra* and a *Mythimna*. It was *Mythimna vetusta* which Mr. Grote suggested might be his *murænula*, not the *Agrotis* as I erroneously suggested in my transcript, nor the *Mamestra* as Mr. Grote stated in the last number of the CAN. ENT.

Agrotis inextricata, Wlk.

A specimen of *Carneades messoria*, Harris, is so labelled in Walker's handwriting, but I cannot find any description of the species under that genus. Walker does, however, describe a *Mamestra inextricata* (C. B. M., Lep. Het., XXXII., 658, 1865), and as the description applies well enough and the specimen is said to be in Dr. Bethune's collection, it may be accepted as type, and cited as a synonym to *Carneades messoria*.

Agrotis indirecta, Wlk., C. B. M., Lep. Het., XXXII., 659, 1865.

In this case also the species is described under *Mamestra*, and the species applies well to the specimen labelled *Agrotis indirecta* in Walker's handwriting. The specimen is *Carneades messoria*, making the fifth name applied to this species in Dr. Bethune's material alone!

How many more of Walker's names can be applied to this species when the types are studied, it is interesting to contemplate? Thus far no redescriptions of *Carneades tessellata* have been identified; but it seems scarcely possible that the species should not have been represented in material received by the British Museum, and its variations must have afforded full scope to Walker's peculiar genius.

Hadena tenebrifera, Wlk., C. B. M., Lep. Het., XXXIII., 714, 1865.

A male specimen in very fair condition is *Semiophora catherina*, Grt., (CAN. ENT., VI., 116, 1874, *Matuta*). The specimen bears Walker's label, agrees with the description, and is unquestionably the type. The species must be known in future as *Semiophora tenebrifera*, Wlk., and *Catherina*, Grt., cited as a synonym.

Apamea velata, Wlk., C. B. M., Lep. Het., XXXII., 671, 1865.

The type is in unusually good condition, bears Walker's label, and is *Apamea sera*, G. & R., (Tr. A. E. S., I., 345, pl. 7., f. 5). The species must be known in future as *Apamea velata*, Wlk., and *sera* cited as a synonym.

Apamea rubescens, Wlk., C. B. M., Lep. Het., XXXII., 671, 1865.

The type, bearing Walker's label, is in very good condition, and is the species recently described by myself as *Tenio-campa venata*, (Ent. Amer., VI., 123, 1890). The species will be known in future as *Tenio-campa rubescens*, to which *venata*, Smith, must be cited as a synonym. I should be delighted to refer all the species described by me as synonyms, could I thereby identify an equal number of the Walker species.

Apamea, n. sp.

A specimen bearing this label, in Mr. Walker's handwriting, is *Parastichtis perbellis*, Grt.

Caradrina multifera, Wlk.

A specimen named by Walker, but bearing a label in Dr. Bethune's handwriting, is also *Parastichtis perbellis*, Grt. The specimen is not the type, and is an evident misidentification.

Xylina signata, Wlk.

The specimen bearing the label in Mr. Walker's handwriting is *Dasylophia interna*, Pack., and is not the type.

Heliothis binotata, Wlk.

A specimen of *Plusia aereoides*, Grt., is so labelled, but I cannot find any description of the species.

Heliothis temperata, Wlk.

This label, in Mr. Walker's handwriting, is attached to a specimen of *Plusia aerea*, Hbn.; but as in the case of the preceding, I cannot find that the name has been sanctioned by a description.

Bryophila, sp.

A specimen of *Acronycta hamamelis*, Gn., is so labelled by Mr. Walker.

Altogether this little lot of insects, while disposing of a few unidentified names, illustrates well the character of Mr. Walker's work. None of these names could have been with any degree of certainty applied from the descriptions to the species really intended, and the generic references are as often misleading as an assistance.

NEW RHOPALOCERA AND HETEROCERA.

BY B. NEUMOEGEN, NEW YORK.

Catopsilia neleis, var. *floridensis* ♂ ♀.

A beautiful variety of *C. neleis*, Boisd. It differs from its tropical types considerably.

The ♂ ♂ have a bright sulphur-yellow in basal half of primaries, the broad anterior space being of a creamy white instead of the citron colour in the typical form.

The same is the case with the secondaries, except that three-quarters of the area of wings are of bright sulphur.

♀ ♀ are not yellow, but creamy-white with large black discal spots, black rimmed apices and anterior margins of primaries, and with prominent citron tinge of the basal area of secondaries.

C. neleis has so far been unknown to our fauna.

The collector whom Mr. Chas. Palm and I sent to the Upper Indian River of Florida succeeded in capturing about fifteen specimens of this form.

Catopsilia agarithe, var. *Maxima*.

The ♂ ♂ intense orange colour with prominent black dotlets at interception of nervures and exterior margins, both on primaries and secondaries.

The ♀ ♀ of equally intense colouring. The discal spot, the diagonal line of dots from apex to submedian nervure and along exterior margin of primaries being brownish red. On secondaries the markings along exterior margin are dark red with blackish tint, much resembling those of *C. philea*.

Expanse of wings, 66 mm.; length of body, 26 mm.

The examples caught (about 50) have been found uniform in size and markings. This is a giant form of its kind and remarkably handsome.

Habitat: Upper Indian River, Fla. Types coll. Neumoegen and Palm.

Oeta compta, var. *floridana*.

Much larger than the typical form. Head, thorax, and primaries of dark reddish-orange. The interspaces between transverse lines of primaries larger than in the type form.

Secondaries: Costa, apex, exterior margin, and nervures black, basal half grayish, hyaline. Abdomen steel blue.

Expanse of wings, 25 mm.; length of body, 11 mm.

Habitat: Upper Indian River, Fla. Types coll. Neumoegen and Palm.

About fifty specimens were caught, all uniform in appearance.

Antarctia Beanii, n. spec.

♂. Thorax and abdomen above and below very hairy, concolorous with primaries, the abdomen somewhat paler, especially at the sides.

Head, breast and antennæ bright reddish-brown, the latter prominently pectinated. A blackish tint on patagiæ, and a faint black dorsal line on abdomen. Legs bright reddish-brown, the femora especially so.

Primaries reddish brown, of lighter tinge at base and basal part of costa. The following maculations in brownish-black. Two large irregular median bands starting from costa, one between base and center, and the other above discal cell respectively, running across the entire wing and converging at center of interior margin, thus forming a triangle, resembling the Roman letter V. A broad band along exterior margin. Fringes blackish. In some specimens the marginal band being broken up in irregular blotches. These various bands are so conspicuously placed as to show the inner spaces, enclosed by them, more prominently, the latter looking like a triangle resting with its base on costa and like a mesial line outwardly curved. Secondaries rose colour. Fringes blackish. Two mesian bands of gray-black, irregularly formed. The anterior band more pronounced, the interior one being more of a curved line of irregular, large dots.

Below, both primaries and secondaries reddish brown, merging into rose colour along anal margin of secondaries and costa of primaries. All maculations grayish-black, faintly indicating marginal and anterior mesian bands on primaries, and showing the mesian bands of secondaries.

♀. Antennæ minutely pectinated, nearly simple, of bright rose brown colour with blackish tinge at base. All maculations brighter than in the ♂, especially the reddish and rose tints.

Expanse of wings: ♂, 33-35 mm.; ♀, 29-30 mm. Length of body: ♂, 10 mm.; ♀, 10 mm.

Habitat: Laggan, Alberta, N. W. T. Types coll. B. Neumoegen.

This is the most northern *Antarctia* so far found in our fauna.

I take great pleasure in dedicating this handsome species to Mr. Bean, to whose indefatigable explorations of the Alberta subalpine fauna I owe my specimens.

Antarctia Beanii, v. *fuscosa*.

A beautiful variation in which the primaries in ♂ and ♀ are nearly uniformly brownish-black from base to exterior margin. The triangular spot at costa as well as the mesian line being slightly indicated.

Types coll. B. Neumoegen.

It seems to me that *Arctia Brucei*, Hy. Edw. (Entom. Amer., Vol. III., p. 183), is not a true *Arctia*, but very closely related to *A. Beanii*. Excepting the slight differences of structure in the ♀ ♀, these insects show conclusively how near our genus *Antarctia*, Hb., comes to Lederer's genus *Ocnogyna*.

All the specimens of *A. Beanii*, including its var. *fuscosa*, having been raised by Mr. Thos. E. Bean, I asked him for some data about the larvæ and their life habits, to which he kindly acceded. I publish them herewith in his own words :

"All specimens are bred from larvæ taken (when in or near final stage) near Laggan. Only one imago has been found in the four seasons I have collected here. One ♂ bred in 1886 from an estray larva was the first seen. In 1888 the imago above mentioned was found. (July 2, a ♂.) In 1889, 2 ♂ ♂, 1 ♀ were bred from estray caterpillars. So up to 1890 only six were seen, though I often searched for them. But in June, 1890, I found them more frequent in one limited tract of about two acres—elsewhere none to be found. Larva feeds on willow exclusively, I think. At any rate all I have found feeding were on willow. The imagines bred in 1890 came from pupa chiefly between July 4th and 21st, though one ♂ delayed until Aug. 4; 1890 was a late season. Those bred in 1889 emerged June 8 and 24 (2 ♂ ♂), June 26 (1 ♀). Males and females equally numerous. The ♂ ♂ are noticeably larger than the ♀ ♀, as an average. As to extremes of size, the ♀ ♀ vary most; there are more extra small ♀ ♀ than ♂ ♂. The ♂ ♂ average decidedly darker than ♀ ♀. Occasional ♀ ♀ are extremely dark. This species occurs at an elevation ranging from 4,800–5,000 feet, so far as observed. The mature larva is about 24 mm. long. Ventral and basal lateral region clothed with rust-red hairs. Dorsal and upper lateral region usually has jet black hair, but sometimes some of the hairs are whitish. Hair of median lateral region sometimes black, sometimes whitish."

Heterocampa nivea, n. sp.

Antennæ slightly pectinated, white above, black below. Head, thorax, abdomen, legs, and both wings white. Thorax and abdomen heavily

tufted. A little dusting of black across basal half of primaries. A few black grains on costa, between discal space and apex, and a few black tiny dots at intersection of nervures and exterior margin of primaries.

Below, uniformly white.

Expanse of wings, 46 mm.; length of body, 14 mm.

Habitat: Virgin River, S. Utah. ♀. Type coll. Chas. Palm.

Gonodonta unica, n. sp.

Palpi, head and collar brilliantly white. Eyes black. Antennæ brown. Thorax heavily tufted, dark brown. Patagiæ powdered with gray. Abdomen and legs bright yellow. Fringes grayish brown. Interior margin inwardly curved near the outer angle and overlapping near base. Primaries, for three-quarters of their extent from base, dark brown with an olive tint, bordered by a dark transverse, undulating line, and showing in this field traces of such lines. Discal spot indicated by olive colour. Base, inner curve of interior margin, and a basal dash of lilac grainlets. The space from costa near apex down to the sharply pointed outer angle transversed by well defined undulating lines of lighter colour. Secondaries of uniform bright yellow. Fringes concolorous. A black irregular marginal band to anal angle.

Below: Primaries brownish-black fading into light yellow along exterior margin. A bright yellow basal tuft, and the costa of the same bright colour. Nervures indicated by yellow lines. Secondaries uniformly yellow.

Expanse of wings, 33 mm.; length of body, 12 mm.

Habitat: Indian River, Fla. Types, ♂♂. Coll. Neumoegen and Palm.

This insect is easily distinguished from its West Indian and South American relatives by its size and yellow secondaries.

Heliodora, n. gen.

Eyes prominent, naked. Infra-clypeal plate projecting. Vestiture hairy. Palpi short and fringed. Abdomen stout, untufted. Primaries long and narrow, rounded at apices, curving somewhat at exterior angle, and bulging near base. Secondaries much broader than primaries, rounded. Tibiæ spinose, armed with two outer claws.

Heliodora magnifica, n. sp.

Eyes black. Antennæ brown, slender. Head, collar, thorax, and upper part of abdomen straw-yellow. Fringes brown. Legs yellowish-

white. Primaries consisting of two distinct, uniform colours. The lower and larger area, starting upward from bulge near base in an outwardly curved line, and rounding off sharply at apex, is a field of chestnut-brown. The rest, from below base rounding upward, running parallel with costa to apex and including half of discal cell, is a costal field of bright yellow. Secondaries light yellow, fading into white along anal margin and near basal area. Brown exterior marginal line. Fringes light yellow.

Below: Abdomen yellowish-white. Primaries and secondaries yellowish-white with a decided metallic sheen. A narrow strip of bright yellow along costa of primaries, and in the centre of same a broad brown dash triangularly formed and pointing towards base. Fringes prominently brown.

Expanse of wings, 22 mm.; length of body, 5 mm.

Habitat: Houston, Texas. Type, ♀. Coll. B. Neumoegen.

This beautiful *Heliothid* is unlike any other of our fauna, both in shape of wings and odd markings. It comes, apparently, near the genus *Schinia*, Hb.

A NEW BUTTERFLY FROM LOWER CALIFORNIA.

BY A. G. WEEKS, JR., BOSTON, MASS.

Pyrgus pelagica, n. sp.

Habitat: San José del Cabo, Lower California.

Expanse, 1.25 inches.

Description.—Under side of palpi and head covered with whitish hairs; top of same blackish-brown gray; forehead with some whitish hairs mixed with the darker. Thorax and abdomen blackish above, end of abdomen shading into gray, beneath whitish. Legs covered with whitish hairs, brownish at ends. Antennæ blackish, with small white annulations at base of each joint; club above blackish, tipped with light brown, below light brown down to joint. Wings above dark brownish gray, with white and grayish-white spots, hind margins with a fringe of dark brownish-gray. Hind margin of forewings edged with a dark line, just within which, in interspaces, is a row of indistinct darkish spots, absent in some specimens. The dark brownish-gray covers marginal

area, and is dusted and irregularly shaded with grayish scales. On costa one-fourth distance from tip to base, between the subcostal nervules, three (sometimes two or one) small white spots. Across centre of wing, extending from edge of costa across end of discoidal cell down to submedian nervule, a whitish band of consecutive spots, of irregular form and varying distinctness, sprinkled more or less with brownish scales. In some specimens this space shades off into ground colour, in others the edges between spots and ground colour are distinctly marked, and bordered with a darkish line. In centre of cell, an irregular whitish spot of same character; between this spot and the spot at end of cell, and below submedian nervule, an irregular whitish spot, dusted more with brownish scales. Base dark brownish-gray, with some grayish scales. The suffusion of the ground colour is more marked in some specimens than others, rendering an accurate general limitation of the spots difficult. Some specimens show a slight yellowish tinge on white spots. Ground colour of hindwings a blackish-brown, of more distinct character than the ground colour of forewings. Costa white. Hind margin edged with a dark line, within which, in interspaces, is a row of white specks, sometimes absent, which, at anal angle, are transversely elongated, forming an indistinct line from inner margin to submedian nervule. Within these, one-third distance to base, a row of brownish spots, extending from costa to inner margin, parallel to hind margin, but not in line, and the one near centre larger than the others, and drawn nearer to cell. Within these, across centre of wing, a prominent whitish band, forming an extension of the same on forewing, but of purer white, ending at submedian nervure. Basal area of ground colour, but toward inner margin, covered with light grayish hairs, which extend along margin to anal angle. Beneath general colour is grayish-white, with a very slight yellowish-brown tinge, and showing shadows of the markings above. Costa of forewing marked with darkish-brown and white, reflecting markings above. Hind margin edged with blackish-brown, and within, covering one-third of marginal area, darkish-brown, with a row of white specks in interspaces. Costa of hindwing white, same as ground colour. Hind margin edged with a line of blackish-brown, shading off into ground colour. In space below submedian nervule, the dark markings of upper side show more prominently than elsewhere.

Described from twelve specimens in my collection, taken near San José del Cabo, in Lower California, by Mr. M. Abbot Frasar, 1888.

MELANISM AND HUMIDITY.

BY J. W. TUTT, F. E. S., WESTCOMBE HILL, LONDON, ENGLAND.*

At different times considerable attention has been paid to the general darkening in colour of our British insects, compared with Central European and with American forms. In Britain, many species become much darker (some absolutely black) on various parts of the West Coasts of Ireland and Great Britain, and, as a general rule, the more humid districts produce the darker specimens, *e. g.*, *Acronycta (Viminia) euphorbiæ* var. *myricæ*, *Xylophasia polyodon* vars. *infuscata* and *nigra*, *Viminia rumicis* var. *salicis*, etc. We find, moreover, that certain geological strata are more prone to produce dark varieties than others, *e. g.* *Gnophos obscurata* on peat, etc., becomes quite black; and in manufacturing districts, where the surfaces of fences, trees, etc., get much darker than is normally the case, insects which rest on them also become darker, to wit., *Amphidasys betularia* var. *doubledayaria*, *Hybernia marginaria (progemmaria)* var. *fuscata*, *Eupithecia rectangulata* var. *nigrosericeata* and *Boarmia repandata* var. *nigra*, (a magnificent form from Huddersfield, in which the whole area of the wings is intensely black). In excessively moist districts, those insects which rest on the ground, trees, rocks, etc., are those which are chiefly affected, because here, the ground, trees, rocks, etc., becoming permanently darkened by rain (*vide* "Entomologist's Record," Vol. I., pp. 123, 124), the darker specimens are thus preserved by "natural selection." Where the geological stratum is naturally dark in colour, "natural selection" acts much in the same way. In manufacturing districts the atmosphere is polluted with carbon particles, and when the rain falls the impurities are brought down with it, but when the water evaporates the solid matters are left behind, and thus surfaces of trees, etc., are artificially darkened. There is no doubt that the great agent in effecting the darkening of insects, which rest in such places, is "natural selection," aided, of course, by the tendency that the surfaces of certain objects have to become darker when continuously wet or damp. The intimate connection between humidity and melanism is well illustrated by the fact that at high altitudes (where the humidity becomes greater) melanism again shows itself, as in

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the case of *Viminia euphorbiae* var. *montivaga*, an Alpine form, closely resembling our var. *myrica*. In Dr. Staudinger's trade lists, too, most of the Alpine forms are spoken of as vars. *obscura*, *suffusa*, *unicolor*, etc.

Our northern latitudes give us, generally, forms more than usually pallid, and which rarely present any tendency to variation in the direction of melanism. As, however, melanic tendencies were first noticed in connection with specimens from a high altitude, it became the usual thing to associate melanism with a low temperature, until the Western shores of the British Isles, with a comparatively high temperature, were found to produce some of our most intensely melanic forms, and it was then found that melanism was accompanied by humidity rather than by a low temperature.

To get reliable results from actual experiment is difficult, as a certain phase of melanism is frequently found to accompany degeneracy and change of constitution (*vide* "Entomologist's Record," Vol. I., pp. 236, 237, 272) brought about by inbreeding. Besides, great care must be taken in experiments, to see that species are chosen in which a natural hereditary tendency to vary does not exist. Mr. Merrifield's experiments, the results of which were read before the Entomological Society of London in December last (*vide* "Entomologist's Record," Vol. I., pp. 267, 268), appear to be open to these objections.

It seems to me that the exciting cause to variation must act in the active larval stage, and not in the comparatively quiescent pupal stage, and an experiment (?) of which I have lately heard, designed to test my theory of humidity, in which some pupæ of *Selenia illustraria* were practically kept in water for a week or two, whilst others were kept very dry, only serves to show how hardy the pupa is, and how difficult to kill. Experiments of this kind partake of the ridiculous and make science look foolish.

As my series of papers on this subject will take some time yet to finish, I should be very thankful if any American entomologists could give me information with regard to the matter, especially as to the general tendency of insects to become (1) more than usually pallid in dry, open areas at a high latitude, and (2) darker in humid districts at either high or low altitudes.

PREPARATORY STAGES OF ARCTIA RECTILINEA, FRENCH.

BY G. H. FRENCH, CARBONDALE, ILL.

Egg.—Diameter, .03 inch ; height, .03 inch ; blunt conic ; smooth. When first deposited white ; after a few days yellow. Duration of this period, five days.

Young Larva.—Length, .07 inch. Cylindrical ; head a little larger than body ; six rows of tubercles bearing long hairs. Colour of body and hairs white ; head black ; a geminate black spot on top of joint 2. Duration of this period, three days.

After First Moults.—Length, .12 inch. Cylindrical ; eight tubercles to each joint ; pale reddish ; the tubercles darker red than the body, from each a few hairs, those on the back black, lateral white ; head black ; two spots of the same on top of joint 2. Duration of this period, five days.

After Second Moults.—Length, .20 inch. Cylindrical ; head a little smaller than body ; pale dull brownish, perhaps a dark dull amber ; a dorsal pale stripe in which is a whitish spot in the top of each joint ; a paler subdorsal stripe, but lacking the white spots ; dorsal tubercles black ; the dorsal space a little darker than the sides ; lateral tubercles concolorous or scarcely darker than the ground ; spreading tufts of hair from the tubercles, the dorsal black, the lateral gray, all short ; a few hairs, one to each tubercle, on posterior part of the body that are slightly longer than the others. Duration of this period, five days.

After Third Moults.—Length, .35 inch. Cylindrical ; head a little smaller than the body ; eight tubercles to each joint ; the dorsal moderately elevated, the lower lateral less so, a gradation from one to the other ; tuft of short spreading hairs of unequal length from each ; the centre of tuft slightly longest ; the central hairs on posterior part of the body a little longer than the others. Ground colour lilac-grey ; a dorsal and subdorsal line of sordid white ; dorsal tubercles black, with the black extending as a border along the upper side of subdorsal line ; the two next tubercles dull pale orange, grey tipped ; the fourth ground colour, with the tip darker ; ground colour outside of tubercles, and lines spotted with black ; head and thoracic feet black ; hairs as before ; prolegs smoky, light at tip. Duration of this period, three days.

After Fourth Moults.—Length, .50 inch. Marked very much as before but the ground colour darker ; dark gray, in some small examples almost black ; the dorsal tubercles shiny black, the lateral yellow-brown ;

dorsal line very pale yellow, almost white ; reddish tinted between the joints ; subdorsal line duller ; head black. Duration of this period, four days.

After Fifth Moul.—Length, .65 inch. Marked much as before but darker ; ground colour lilac-grey, but so obscured by the black, enlarged dorsal tubercles and mottlings as to be almost black ; lateral tubercles as before ; dorsal stripe bright creamy-white ; legs and head black ; prolegs orange ochreous ; lateral hairs grey, dorsal black.

Mature Larva.—Length, .95 inch. Cylindrical ; ten tubercles to each joint ; a small one close to the dorsal stripe, each with a tuft of spreading hairs that are studded with points like the forked point of a lightning rod, but shorter in proportion to the hairs. Colour mostly as at the beginning of the stage ; the dorsal tubercles show orange on the top ; the subdorsal line paler than the ground colour ; abdomen and feet pale. Duration of this period, eleven days.

Chrysalis.—Length, .55 inch. Diameter through joint 1, .16 inch ; through joint 3, .18 inch ; length of wing cases, .28 inch, reaching almost to posterior part of joint 5 ; head rounded ; two tubercles above the origin of the antennæ that are hairy, also two hairs each to two lesser tubercles between the origin of antennæ ; terminal joint conical, scarcely any depression to cremaster ; a terminal series of spreading hooks ; smooth ; thorax and wing cases very slightly corrugated ; a slight raised ring to anterior part of each abdominal joint. Colour, brown-black. Duration of this period, from eleven to twenty-two days.

This species, like most of the *Arctians*, is a general feeder, but eats some things in preference to others. Among the several plants put into the breeding cage, clover seemed to be preferred, and they were fed upon that through most of their growth. As will be seen by the figures given, the time from the egg to the imago is from forty-eight to fifty-nine days. The eggs were deposited July 16, 1889, and the last moths came out September 12 the same year. There is with us an earlier brood of the moths coming out in May, making three broods in a season, though in the northern part of the United States, if it is found there, there are probably only two broods. The last brood of larvæ, like its allies, hibernates, and of course this lengthens the period from egg to imago over that of the two summer broods. Like other *Arctia* larvæ, these are very active when disturbed, running rapidly and hiding under the food in their cage. They also hide in this way when not feeding.

Among a large number bred, the males were nearly constant in their markings, varying slightly in the size of the spots near the outer margin of the hindwings and occasionally with the beginning of a transverse line inside the first one on the forewings, shown by a little bending in of the pale on the costal margin so as to sometimes touch the subcostal vein. Some of the females were of this type, but many of them varied from this by having less of the pale colour on the forewings, even to the partial or total obliteration of the inner of the two transverse lines. The tendency with such examples would be to a blending and enlarging of the black spots on the terminal border of the hindwings, and a blending of these with the black of the edge, making a nearly solid terminal border. The red on the hindwings was constant, there being no appreciable difference in this respect between the sexes, as there is in *Nais*, nor in light or dark examples of either sex. The dark examples would have the black on the abdomen a little more prominent than on the light. The characteristic marks, straight transverse lines on forewings and veins pale, were constant whatever the other variations might be. In size, my specimens were small from being underfed, as a result of a great many larvæ crowded together in a single breeding cage. If they had been separated as much as they naturally would be in feeding in the open fields they would have been as large as caught specimens.

TWO NEW SPECIES OF CANADIAN PIMPLINÆ.

BY W. HAGUE HARRINGTON, OTTAWA.

Xorides caryæ, n. sp.

Female.—Length 11 to 16 mm. Black with yellowish-white markings. Head swollen, interior orbits, interrupted opposite antennæ, and palpi white; face below antennæ punctured, between antennæ and ocelli polished; antennæ slender, black. Thorax with the pectus and pleuræ finely punctate, polished; disc of mesothorax transversely rugulose; metathorax rounded, faintly sulcate medially and rugosely punctured and aciculated; sides of prothorax, two lines on mesothorax, two spots, sometimes confluent, on scutellum, the post-scutellum, the tegulæ and a broad stripe on pleura, continued on middle coxa, yellowish-white; legs, including coxæ, pale rufous or honey-yellow, anterior ones paler, the anterior coxæ, stripe on middle coxæ outwardly, second joint of trochanters and the knees yellow; tibiæ and tarsi piceous or blackish, the former with a

pale line within ; wings hyaline, nervures and stigma black. Abdomen with first segment rugosely sculptured, the segments becoming smoother toward apex of abdomen ; incisures of joints whitish, venter banded with white ; ovipositor 8 mm. in length, or hardly as long as abdomen.

Male.—Differs from female as follows : Face below antennæ and the scape beneath yellow ; anterior coxæ and most of prothorax below yellow ; abdomen long, slender and polished, with the tip of segments narrowly white. Length 16 mm.

Described from 4 ♀ and 2 ♂ taken in June and July on felled bitter-hickory (*Carya amara*). The females were ovipositing, and probably are parasites of *Saperda discoidea* or *Dorchaschema nigrum*.

The American species, all of which occur in Canada, may be tabulated as follows :—

Abdomen entirely black..... *X. occidentalis*, Cress.

Abdomen with white markings ;

Ovipositor long..... *X. vittifrons*, Cress.

Ovipositor short,

Pleura black..... *X. borealis*, Cress.

Pleura with white band..... *X. caryæ*, n. sp.

Xorides canadensis, Prov. (Nat. Can., VII., 248), = *Xylonomus albopictus*, Cress.

Xorides vittifrons, Cress., has been found in about the same numbers, as *X. caryæ*, but upon old maples infested with *Dicerca divaricata*, *Xiphydria albicornis*, *Tremex columba*, etc.

Xorides borealis, Cress., was described from Hudson Bay region ; a ♀ which I refer to this species differs from the original description in having the posterior femora rufous instead of black.

Xorides occidentalis, Cress., is found in Vancouver Island.

Xylonomus canadensis, n. sp.

Female.—Black ; length 22 to 26 mm ; expanse of wings 30 to 33 mm. Head large, face and vertex rugulose, cheeks aciculated, clypeus small with sutures obscurely rufous ; antennæ with annulus on joints 10-14. Thorax subopaque above and strongly punctured, pleura and pectus coarsely punctured but shining ; mesothorax flattened or slightly depressed medially, aciculated and with slight median carina ; scutellum punctured, shining ; metathorax with two discal carinæ enclosing a narrow oval area, lateral carinæ indistinct except at base near spiracles ; rugosely punctate and with small posterior tubercles ; legs black, knees white, four anterior

tarsi white with terminal joint black, posterior tarsi with terminal joint black, base of first white, remainder piceous; wings faintly clouded, stigma, except white spot at base, and nervures black. Abdomen opaque, with first segment suddenly widened and sides subparallel beyond spiracles, basal segments rugulose, with margins polished, becoming smoother toward apex; ovipositor as long as body, rufous, sheaths black.

Male.—Length 17 to 20 mm.; expanse of wings 24 mm. Differs from female in having antennæ entirely black and more slender, and the anterior tibiæ have a white-line externally.

Described from 4 ♀ and 2 ♂ captured at intervals since 1878 on fences, bridges, etc.

This species looks very much like *X. stigmaferus*, Say (and a specimen was so determined for me by Provancher), but is abundantly distinct by its stouter abdomen and differently coloured tarsi, and its more robust and opaque appearance.

The American species may be tabulated as follows:—

Prothorax above with lateral tubercles;

Wings with a fuscous band.....*X. australis*, Cress.

Wings hyaline, legs black.....*X. Rileyi*, Ashm.

Wings hyaline, legs partly red.....*X. humeralis*, Say.

Prothorax above without tubercles;

Abdomen with lateral white spots.....*X. albopictus*, Cress.

Abdomen with tips of segments white.....*X. insularis*, Cress.

Abdomen entirely black,

Legs entirely black.....*X. cincticornis*, Cress.

Legs black and white.

First segment of abdomen slender...*X. stigmaferus*, Say.

First segment of abdomen stout...*X. canadensis*, n. sp.

Legs ferrugineous.....*X. frigidus*, Cress.

Abdomen rufous,

Pleura red.....*X. pulcher*, Ashm.

Pleura black.....*X. calidus*, Prov.

Uniformly ferrugineous....*X. californicus*, Cress.

Obscure rufous, legs black.....*X. floridanus*, Ashm.

The following are the species recorded from Canada: *albopictus* (Ont. and Que.), *calidus* (Ottawa), *frigidus* (Hud. Bay), *humeralis* (Ont. and Que.), *insularis* (V. I.), *stigmaferus* (Ont. and Que.), *canadensis* (Ottawa).

Provancher described *calidus* from a specimen which I sent to him, and although I cannot now remember the insect, the description shows that it is very close to the species since described by Ashmead as *pulcher*. Perhaps the latter may be only a variety.

NEMATUS PALLIDIVENTRIS, FALLEN—A FRESH IMPORTATION.

BY REV. THOMAS W. FYLES, SOUTH QUEBEC.

In September of last year I discovered the larvæ of a species of *Nematus* feeding upon a willow introduced from Russia by the late Mr. Charles Gibb. Like others of the genus these larvæ were gregarious and threw up the hinder parts of the body when disturbed. They were full fed and buried themselves on September 24th. The flies appeared in the end of March. The following is a description of the insect:—

Full-grown larva.—One inch long; head dark brown; body pale green above with numerous black dots, pale greenish-yellow underneath; anal segment yellow.

Pupa.—Enclosed in a dark brown cocoon, less compact than that of *N. Erichsonii*.

Imago.—Length of body four lines; expanse of wings six and a-half lines; head and thorax black; antennæ brown; ocelli prominent, stand out like black heads; legs honey-yellow, tarsi of hind legs brown; abdomen pale orange, with a dorsal line of triangular spots—a spot to a segment—the obtuse angle of one spot approaching the middle of the base of the next, and so on to the end.

I submitted the perfect insects to the Reverend Abbé Provancher, and he has kindly informed me that after careful examination, and comparison of them with specimens of his own collection, he has come to the conclusion that the species is *Nematus pallidiventris*, Fallen, of Sweden, France, etc., and that it is a new addition to our Hymenopterous fauna. The insect, he says, is very near to several of our American species but identical with none.

Should this new importation become established in this country, it will be interesting to watch its progress.

NOTES.

A CORRECTION.

In Entom. Amer., Vol. VI., p. 173, in my description of *Euchaetes conspicua* there is erroneously inserted: "This insect comes near *E. cada-verosa*, Gr.," etc., etc. This should read: "This insect comes near *E. abdominalis*, Gr. It is easily recognized by its conspicuous costal lines. *E. abdominalis* is a Florida insect, whilst this seems to be the Colorado representative." Entom. Amer. having ceased to appear, you will confer a favour on me by publishing this in your esteemed paper.

B. NEUMOEGEN.

NOTE ON AMMOPHILA ROBUSTA.

Sept. 20, 1890, I was collecting along the sunny side of a railroad embankment, where several species of digger wasps were plentiful. I stopped to watch the operations of a female of the above species. She was opening a filled-up hole, and soon pulled out a larva resembling that of the cabbage *Plusia*, nearly grown. She laid it three or four inches from the hole, and was standing over it, apparently resting, when another wasp of the same species alighted about six inches away, and, without an instant's hesitation, attacked No. 1, which had turned to face the assault. The fight which ensued was of the most spirited character. They "clinched" at the first onset, and remained in that position, their ventral surfaces in close contact, and the body of each closely embraced by the fore and middle legs of the other. One had grasped the neck of the other with her mandibles, and both were striving to use their stings, their abdomens being curved so as to bring these weapons into favorable position. These details I gathered one at a time, for they did not lie still by any means, but went rolling, scratching, and buzzing down the side of the embankment. On account of grass stubs (the vegetation had been burned off) their progress downward was not rapid, and after nearly a minute they were about two feet from the starting place. Neither seemed to have gained any advantage. At this point a third specimen arrived, and threw herself upon the other two. The fight was now more vigorous, if possible, than before. After a few seconds one released herself and flew away. A second soon followed suit. The third, apparently under great excitement, dashed wildly about, seeming to be looking for the larva before mentioned. From this I supposed her to be the one I first observed.

She passed within an inch of it several times, but seemed not to see it. After a minute or two one of the other combatants (as I suppose) alighted and resumed the fight, but soon left again. At this time, as I feared that the last one was about to leave also, I captured her. Whether the hole was of her own making in the first place, or belonged to one of the other contestants, or to none of them, I had no means of ascertaining; but there was evidently a bold attempt at robbery somewhere in the incident.

Brookings, So. Dak.

J. M. ALDRICH.

EXCURSION.

The entomologists of New York, Brooklyn, Newark, Philadelphia and localities near these cities are invited to attend the second annual field meeting to be held under the auspices of the Entomological Societies of the cities at Jamesburgh, N. J., on July 4th, next. Jamesburgh is on the Amboy Division of the Pennsylvania R.R., and may be reached from N. Y., *via* Monmouth Junction, at 7.20 a. m.; Newark, 7.50 a. m.; Philadelphia, Broad St., 6.50 a. m.; Camden, 7.00 a. m. Later trains leave N. Y. *via* Rahway and Philadelphia, on the Long Branch Division, but it is urged that the early train be used, as this will bring the party into Jamesburgh at the same time. All those desiring or expecting to attend will please notify one of the members of the committee, from whom also further information can be obtained. The notification is important, in order that proper arrangements may be made at Jamesburgh. Committee:—C. P. Machesney, 65 Broadway, N. Y.; Dr. Hy. Skinner, Amer. Ent. Soc., Logan Sq., Philadelphia; Prof. J. B. Smith, New Brunswick, N. J.; H. W. Wenzel, 1117 Moore St., Philadelphia, Pa.

A CANNIBAL CRICKET.

On September 11th, 1889, I observed, on a grassy slope, a short distance north of this city, a large ♀ black cricket, *Gryllus neglectus*, feeding on a recently killed ♂. I observed her carefully for a few minutes. There was a large wound on the side of the abdomen of the ♂, and she was greedily eating the semifluid and soft parts. She was not easily alarmed, being very intent on her meal; but, when I disturbed her with the handle of my net, she seized hold of her gentleman friend and lugged him away several inches and again resumed her meal. On the same slope, a few yards away, I observed another ♀ gnawing at the thorax of what most likely was a ♂.

I failed to determine whether the ♂'s had died a natural death, or had been butchered by their wives. I had not noticed this cannibalistic habit before, but this may account for the many fragments of this species always common towards the fall season. I have often noticed the cannibalistic habit of the larvæ of *Pyrameis cardui*, and other butterflies while feeding in captivity. I never knew them to kill each other, but if one got injured so that the bioplasm flowed out, the others seemed to relish it very much, and continued to feed on it until completely exhausted.

WM. BRODIE, Toronto.

NOTE ON AMBLYOPONE PALLIPES, HALD.

In 1885 among material sent to Abbé Provancher was a curious ant, of which two examples had been for some time in my collection, obtained apparently by moss-sifting. The Abbé expressed astonishment at the occurrence of such a species in Canada, stating that it belonged to the genus *Amblyopone*, and that it would be the type of a new species which he proposed to call *A. canadensis*. He subsequently (Add. Faun. Hym., p. 240) described it as the worker of *A. binodosus*, believing it to belong to the same species as a male formerly described by him (Nat. Can., XII., p. 205), as a braconid under the name *Arotropus binodosus*.* During subsequent seasons I searched carefully for this species without success, and almost despaired of determining its habitat. This season, however, I have been more fortunate, and on the 19th April was much pleased at finding one worker under a stone about two miles west of the city. A few days later—30th April—on the opposite side of the Ottawa, near Hull, I found in a rotten log a colony composed of several workers and about a dozen larvæ. Consigning four adults to my killing-bottle, I placed the larvæ and their remaining guardians in a box with a quantity of the damp, rotten wood in which they were found. A vigorous search in the vicinity resulted in the discovery of two similar colonies in another log, which were also taken. Should I not succeed in obtaining females and males from the larvæ then obtained, I will hope to do so by searching in June in the same locality. The ants are very slow in their movements, and walk with the quadrate flat head held horizontally, and with the long mandibles open, thus seeming much larger than killed specimens, in which the head is deflexed. The larvæ resemble those of *Myrmica*, but are not so pubescent as the only species, *M. levinodis*, Nyl., of which

* Cresson in his list refers *Arotropus binodosus* to the genus *Ponera*.

I had larvæ for comparison. An examination of my workers by Haldemann's description of *A. pallipes* convinces me that they belong to that species. Haldeman states that the species is found in stumps in June.

W. HAGUE HARRINGTON.

BOOK NOTICES.

ANNUAL REPORT OF THE EXPERIMENTAL FARMS: Ottawa: pp. 314; 1891.

The Director of the Experimental Farms of the Dominion of Canada has recently issued his report for the past year, and a very interesting "blue book" it is. The record of experiments with two-rowed barley is particularly valuable and important at the present time, and concerns everyone who is interested in the welfare and prosperity of this province. The reports of the Agriculturist, who treats especially of Dairying, of the Horticulturist, Chemist and Poultry Manager, are all useful and instructive; but the one which especially interests us is, of course, that of the Entomologist and Botanist, Mr. James Fletcher. His share of the report occupies over fifty pages, and is illustrated with some wood cuts of noxious insects, and nine beautiful full-page plates of various useful grasses. The insects treated of are the American Frit Fly (*Oscinis variabilis*), the Cabbage Maggot (*Anthomyia brassicæ*), the Diamond-back Moth (*Plutella cruciferarum*), whose larvæ attack the leaves of cabbages, the Mediterranean Flour Moth (*Ephestia Kühniella*), the Pea Weevil (*Bruchus pisi*), the Strawberry Weevil (*Anthonomus musculus*), and the Vancouver Island Oak Looper (*Ellopiæ somniaria*). In each instance Mr. Fletcher fully and carefully describes the mode of attack, and then gives the most satisfactory remedies. It is hardly necessary to tell our readers, who are familiar with Mr. Fletcher's work, that these articles are as complete and as accurate as is possible in a limited space. It is very cheering to find (p. 169) that the mill that was so badly infested with the *Ephestia* moth year before last (of which the writer was an eye-witness), has been completely cleared of the pest by scrupulously carrying out, though with no little labour and expense, the directions of the entomologist. In spite of this example, it is surprising to find that the proprietors of other mills and feed stores in the same city are too apathetic and careless to take any measures to exterminate this insect when it appears on their premises. They will soon find that such neglect means utter ruin to their business, unless they take warning in time. The remainder of

Mr. Fletcher's report is almost entirely devoted to the subject of Grasses, of which he has been cultivating for the sake of experiment over a hundred different kinds. C. J. S. B.

THE BUTTERFLIES OF NORTH AMERICA: by W. H. Edwards. Third series; Part XI.

It is hardly necessary to do more than chronicle the issue of a new part of this magnificent work. The beauty and accuracy of the plates, and the excellence and value of the descriptive letter-press are too well known to need any further commendation. The part now before us illustrates and describes the complete life history, in all its stages, of *Apatura flora*, Edw., *Satyrus Meadii*, Edw., *Chionobas chryxus*, Doubleday, with its variety *Calais*, Scudder. The last mentioned species is of peculiar interest to us, as it is found throughout the Rocky Mountains from Colorado to Canada. A most graphic account of its habits is given by Mr. Bruce, who has observed the insect for several years past. Why is it that every North American Lepidopterist does not possess himself of a copy of this noble work? It can hardly be the cost, for the numbers appear at such long intervals that a very little self denial even on the part of the impecunious would suffice for their purchase. While the subscriber would get a joy and treasure for life, let him think what a gratification and help it would be to Mr. Edwards to have his subscription list trebled, as it should be. C. J. S. B.

CORRESPONDENCE.

DONATIONS TO LIBRARY.

Dear Sir,—I have much pleasure in acknowledging the receipt of the following valuable addition to the books in the library of the Entomological Society of Ontario:—A generous donation from its President; Manual of Geology, Dana; Principles of Geology, Lyell; Elementary Geology, Hitchcock; Geology of the Globe, Hitchcock; Geology and Mineralogy, 2 vols., Buckland; Mineral Resources of Canada, 1890; Geological Survey of Canada; Geological Survey of Indiana, 6 vols., with maps; Geology of Canada; Principles of Zoology, Agassiz & Gould; Humboldt's Cosmos, 5 vols.; Humboldt's Views of Nature; Naturalist's Note Book; Evenings at the Microscope, Gosse; Year Book of Science and Art, 2 vols.; Annual Reports of Maine Board of Agriculture, 7 vols.

J. ALSTON MOFFAT, Librarian.

Mailed June 4th.

The Canadian Entomologist.

VOL. XXIII.

LONDON, JULY, 1891.

No. 7.

HENRY EDWARDS.

This well-known and highly-esteemed entomologist died at his home in New York City, at 1.30 a.m., on the ninth day of June, 1891. His death was caused by dropsy and other complicated troubles, which affected the heart.

In him the world has lost an earnest devotee to science and art, and those who knew him, a kind-hearted, generous, true and sympathizing friend. In his death, entomological science has lost one of its most active and energetic workers, and his loss is deeply felt and deplored by all who knew him, and he has passed out of this earthly domain with the affectionate regret of many grateful and loving friends.

Mr. Edwards was born in Ross, Herefordshire, England, August 27th, 1830, and was destined by his father to become a lawyer. After studying for some time without evincing any particular aptitude for the profession, he entered a London counting house, and frequently appeared in amateur theatricals, for which he had much talent. He finally decided, much against the wishes of his parents, to adopt the professional stage. In 1853 he embarked for Australia, where he made his first appearance as an actor, and where he passed many prosperous years. From Australia he drifted to Peru and Panama, and in 1867 he reached San Francisco, Calif. In about 1877 he made his first appearance in the east, at Boston, and finally in 1879 he came to New York. In 1889-90 he again visited his old home in Australia, from where he returned last year. During all these years he was constantly connected with the stage, until only a short time previous to his decease, when he was compelled to retire on account of his illness. At the time of his death he had just returned from a trip to the Catskill Mountains, where he was staying for his health, and three and a-half hours later he entered into rest and the everlasting silence.

As an entomologist, Mr. Edwards was world-known, and was considered one of the greatest authorities of the science, to which he was attached ever since his boyhood days. He was chiefly known by his excellent papers on the Pacific Coast Lepidoptera, which contain the descriptions of many new and interesting species from that region. He was also known by his articles on North American *Ægeriadae*, of which family he described nearly all our American species. Besides these papers he has also written many other articles on descriptions of new species and transformations of Lepidoptera. He also edited three volumes of the journal "Papilio." The last large work he published was his "Bibliographical Catalogue of the Described Transformations of North American Lepidoptera," which is now in the hands of all our working entomologists. Mr. Edwards spent much money for the increase of his collection of insects, and devoted all his leisure time to his favourite study. His travels afforded him many rare opportunities for collecting material for his collection and writings. The collection consists of about 300,000 specimens of insects of all the orders from all parts of the globe. It contains the types of all the species he described, about four hundred and fifty, except a few which are in other collections. It also contains a number of Grote's types of Noctuidæ and Pyralidæ, and many of Fish's types of Pterophoridae, and types of other writers. It contains also the unique pair of *Oniticellus californicus*, and many other uniques, oddities and rareties of considerable value. The collection is one of the largest private collections in the world. His library consists of about five hundred volumes of entomological works, and about double the number of pamphlets, and about two thousand volumes on travels and other topics. (I am not sure about these figures.)

Mr. Edwards belonged to many scientific and other societies. He was for some time vice-president of the California Academy of Sciences, life-member Brooklyn Entomological Society, member of the Torrey Botanical Club, Players' Club (New York), Bohemian Club (San Francisco), corresponding member Boston Society Natural History, San Francisco Microscopical Society, San Diego Natural History Society, Belgium Natural History Society, etc.

He leaves a widow who deeply mourns his loss, and we would here add our condolence and sympathy and heart-felt regret to her irreparable bereavement.

New York, June 15th, 1891.

WM. BEUTENMULLER.

PARTIAL PREPARATORY STAGES OF SMERINTHUS
OPHTHALMICUS, BD.

BY G. H. FRENCH, CARBONDALE, ILL.

After First Moul.—Length .45 inch. Cylindrical, head with an elevated point upwards, in a subpyramidal point, the top in two points and about a third higher than the body; when at rest the jaws under back part of head with the point obliquely forward. Eight transverse wrinkles to each joint; green studded with pale green points; a subdorsal pale line, as usual converging to caudal horn; on sides, oblique pale lines that nearly coincide with a series on the dorsum; the pale parts yellowish-green; caudal horn reddish tinted; head with a pale stripe on each side of face, the two coming together above. Previous to the next moult, smooth, the oblique lines showing very pale; the oblique stripe and caudal horn creamy-white; the anterior base of horn reddish. Duration of this period 5 days.

After Second Moul.—Length .90 inch. Colour green, a little dull and rather blue-tinted; each joint with 8 transverse folds that are studded with yellowish-green points that are but little lighter than the ground, a subdorsal line made of these points; a dorsal line and oblique stripe of the darker green without points, these lines defined by the points, on the sides below subdorsal line a similar stripe defined posteriorly by a row of these points more yellowish than the dorsal, the stripe that runs to the caudal horn creamy-white, as is also the caudal horn; the latter short hairy. Head pointed above as before and also the side of the face with a line of points more yellow than the last oblique stripe; thoracic feet red-tinted. Duration of this period 5 days.

After Third Moul.—Length 1.25 inches. Green, slightly bluish; head still pointed but not quite so prominent as in preceding stages, the stripe rounding at the top; bluish-green, stripes yellow; stripes on back and sides as before; caudal horn pale bluish purple, more blue at base, the stripe from this down the sides very pale lemon-yellow; prolegs concolorous; thoracic legs paler, red tipped, stigmata black ringed, centre creamy. Duration of this period 5 days.

After Fourth Moul.—Length 1.40 inches. Bright green of a yellowish tint; head blue-green; granulations more white; side stripes yellowish-green, the one that extends to the caudal horn creamy, with a

slight greenish tint ; caudal horn purple-blue, except the sides which are a continuation of the lateral stripe ; jaws black, clypeus and anterior feet pale red ; head blunt, stripe yellow ; stripes on anal appendages yellow. Duration of this period 6 days.

Chrysalis.—Length 1.35 inches ; to the back of wing cases, .64 inch ; and this extends to posterior part of joint 5 ; depth through joint 5, .42 inch ; through 4, .40 inch ; through 3, .39 inch ; through 2, .37 inch ; end of tongue case, .55 inch from the anterior end. Cylindrical, tapering gradually back from joint 5, cremaster triangular tuberculate, especially on the dorsal part and on sides at base, round dorsally and flattened ventrally, no hooks but slightly forked terminally ; head rounded. Colour chestnut-brown, nearly uniform ; wing, tongue and leg cases a little darker than the rest ; the abdomen slightly punctured. Duration of this period 15 to 17 days.

A comparison of the pupæ of this species with *Geminatus* shows the following differences:—The cremaster on *Geminatus* is triangular, more slender, less roughly tuberculate dorsally and laterally ; this in *Ophthalmicus* having a distinct tubercle each side at the base that is lacking in *Geminatus*. The cremaster in *Geminatus* is nearly conical by reason of its being only slightly flattened ventrally, while in *Ophthalmicus* it is distinctly flattened ventrally, and dorsally is contracted at the base. A chrysalis of *Geminatus* measures as follows : Length 1.15 inches ; depth through joint 5, .40 inch ; joint 4, .38 inch ; joint 3, .37 inch ; length to end of wing cases, .60 inch ; to end of tongue case, .48 inch. A comparison of these figures with the measurements of *Ophthalmicus* shows a different proportion between the two pupæ. The pupa skin is about twice as stiff in *Geminatus* as it is in *Ophthalmicus*. Besides this, the larva of *Ophthalmicus* differs from that of *Geminatus* in being less cylindrical, the third and fourth joints being enlarged, thereby making it resemble the larvæ of *Everyx Myron*.

The food plant is the same as that of *Geminatus*.

The larvæ from which the above descriptions were made were received from the Hon. C. F. McGlashan, of Truckee, California. They were sent as eggs June 17th, 1889, but were received hatched June 22nd. The imagines were produced August 2nd and 3rd of the same year, making a total period from egg to imago, of the summer brood, of 47 days. The time of hatching shows that there are two broods in a season.

ABOUT PSEUDOHAZIS AND ITS VARIATIONS.

BY B. NEUMOESEN, NEW YORK.

The genus *Pseudohazis*, Gr. & R., has only two typical representatives so far known, one being *Eglanterina*, Bd., with the purple colouring, and the other the white *Hera*, Harr., from Utah's salt regions. *Hera* has to be considered a distinct species, for, aside from its white colour, its primaries are falcated, while those of *Eglanterina* are broad and blunt. All the rest of named insects are variations of *Eglanterina*,—*Pica*, Walk., being especially recognizable by its heavy black markings and black basal areas. I have added to our list to-day the beautiful *Ab. Denudata* already figured in Strecker's book No. 15, but not described, and of which I possess a striking example, and a constant variation of *Hera* from Oregon, which I name *Marcata*. Both insects are herewith described.

Our list of this genus to the present day stands as follows :—

Eglanterina, Bd.

var. *Shastensis*, Behr.

“ *Nuttalli*, Streck.

“ *pica*, Wlk.

“ *Arizonensis*, Streck.

ab. *denudata*, Neum.

Hera, Harr.

var. *Marcata*, Neum.

Eglanterina ab. *Denudata*.

Head, thorax, primaries and secondaries above and below of rich yellow; nearly denude of all markings. Abdomen yellow with black segmentary bands. Primaries, black costa, a beautiful rose tinge at base and along costa to apex, as well as along interior margin. Apical tip black, fading inwardly; a little black dusting, indicating location of discal spots and costal terminus of mesian bands respectively. Submedian cells tinted with light rose. Secondaries with black costa and black dusted discal spots. Very faint indication of mesian band and basal black field. Below, primaries and secondaries uniformly rich yellow, with rose tints at apical part of costa of primaries, and on upper half of secondaries. Abdomen tinted with rose; costa of primaries pronouncedly black, and black spots indicating costal terminus of mesian band and discal spot. Secondaries, costa black and light black indications of mesian band and

discal spot. In both wings the nervures are accentuated with black, especially at intersection with exterior margins ; black marginal lines and yellow fringes.

Habitat—California.

Type, ♂. Coll., B. Neumoegen.

The specimen figured in Strecker's Rhopal. and Heter., No. 15, plate XV., fig. 9, but not described, is an *Ab. Denudata*, with markings a little more pronounced than in my specimen.

Hera, var. *Marcata*.

Antennæ dark brown. Head, prothorax, patagiæ and legs light yellow. Thorax the same, with blackish ground. Abdomen white, with black segmentary bands ; lower border of each segment as well as anal tuft of bright yellow. Primaries pure white. Costa, apices and fringes black. The intersection of each nervure at exterior margin accentuated by black dashes, pointing inwardly. A prominent black mesian line and a large black discal spot, faintly showing the white kernel. A basal dash encircled by a black outwardly-curved line from inner margin to costa, terminating in an irregular costal spot.

Secondaries pure white with black marginal line and fringes interspersed with black, a large black discal spot and mesian line ; the latter curved outwardly near median nervure so acutely as to give the line nearly a triangular shape. In some specimens the ends of discal spot are confluent with mesian line. Below, primaries and secondaries pure white with markings as above. Abdomen with black lateral dots and black segmentary bands. Secondaries with black costa and termini of nervures slightly tipped with black ; a black irregular line encircling basal space.

Types. Coll., B. Neumoegen.

Habitat—Klamath County, Oregon.

This handsome variation is so decidedly marked as to be distinguishable at first glance from the typical *Hera* by the entire absence of black terminal dashes of nervures of secondaries and the lack of black basal tinges.

I have about fifty specimens before me all uniform in appearance.

THE MALE GENITALIA AND THE SUBDIVISIONS OF AGROTIS.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

It is forty years ago since Lederer used the male genitalia to group the European species of *Agrotis*. According to the latest general work on the subject, the 127 European species of *Agrotis* fall into nine groups, characterized chiefly by changes in the form of the male genitalic appendages. The failure to correlate these European groups with the American subdivisions of *Agrotis*, prevents me from considering Prof. Smith's recent revision as complete, since I have demonstrated the near relation between the two faunæ exhibited by *Noctuinae* of the Old and New World.

The characters drawn from the male genitalia must be ranked with those from the antennæ. They are sexual or secondary characters. On this account to use them as the sole basis for generic separation is hardly necessary. The genitalia in the *Noctuidæ* are found to differ markedly in otherwise very closely related species. In other species, easily distinguishable, they are practically of the same pattern. Undoubtedly we must know and study all the parts of an insect, but no single character will enable us to classify an order. It will be found as impracticable to classify the moths by their tails, as by their wings alone or chiefly, as attempted by Herrich-Schæffer. Among the representative species this change in the structure of the genitalic appendages is instructive and indicative of their morphological value. The European *Agrotis augur* is a well marked and tolerably isolated species, presenting peculiarities in shape, size, colour and pattern. In all these respects the American *Agrotis haruspica* is nearly its exact counterpart. As the basis of separation of the two, the immature stages not having been used, we have a tendency to obsolescence of certain markings and perhaps a hardly perceptible change in the exact shade and average size in *haruspica*. Now the genitalia are shown to differ in pattern as well. From this fact we must logically conclude that the genitalia are more easily impressed and changed by environment than colour, size and pattern, or other structure. Consequently the genitalia are subject to variation, and the question rather comes up, are the characters drawn from the male genitalia of specific value? The true ground for considering the two species distinct is that they do not interbreed and produce each other, and that

so far the American examples may be picked out by experts. When these conditions can no longer be fulfilled there would be no ground for retaining a different name. The mere fact of their inhabiting different continents is not sufficient, they must breed true to type and not produce each other. Then we can be sure we have to do with separate cycles of existence and we can catalogue the fact. As the genitalia are concealed, their structure is not so apparent, and it is clear that repeated observations are necessary to verify the statements drawn from solitary dissections. But granting what has been published as substantially reliable, there yet remains the test of breeding to be applied to the genitalic species. We have an instance in the genitalic species of *Nisoniades*. These butterflies have not been bred to ascertain if they remain true in their genitalic peculiarities, if one genitalic type does not produce the other, if the caterpillars show no differences. Until all these matters are cleared up we can arrive at no final conclusion as to the value of genitalic characters, as to which single observations must be checked by repeated experiments. Writers on the subject have apparently proceeded on the basis that the male genitalia are formed, not by deposits of chitine but of cast iron, moulded so as to fit and give at last a stable and firm reality to our artificial system of classification. Vain expectations! The characters, on which we are obliged to found all our categories, are one in quality and only differ in quantity; what is generic is specific also, and what is specific is varietal.

In my Buffalo lists, 1874-1876, I was at some trouble to give the generic types of the Noctuidæ, and my action, unless it can be shown that I was in any one case in error, is binding from those dates. Prof. Smith was, therefore, no longer free to retain *Peridroma* for *occulta*, as I accepted *Eurois* for that species, without showing my action to have been at the time unwarranted. To place my *A. pellucidalis* in the same "genus" with *occulta*, and on account of the genitalia, is not to be defended. The variability of the genitalia cannot be made a basis for generic separation nor their agreement for generic grouping without other characters. The two insects are strongly different in form and vestiture, the hindwings being in the *Anicla* group translucent, where I would refer my species. The work of Prof. Smith bears proof, from internal evidence, that the intention was at first to consider but one genus, *Agrotis*. Not only are the "genera" called "groups" in the body of the text on

occasion, but in the case of *Agrotis pellucidalis* the change of title has been forgotten. According to Hofmann the type of *aplecta* is *prasina*. I have made the following types of named subgeneric divisions: *occulta* of *Eurois*, *alabamæ* of *Anicla*, *lewisii-tessellata* of *Pleonectopoda*, *mærens-citricolor* of *Carneades*, *catherina* of *Matuta*. These must first be used before new titles are coined. There remains a literary research as to the oldest generic titles used in Europe for species of *Agrotis in sensu* Lederer, which is not in any sense a superficial assemblage, but a scientifically and properly assorted genus of *Noctuide*. The question as to the rank of the species with tuberculate clypeus may be separately considered. On my discovery of the character I made it, as elsewhere, the basis for a distinct genus. Had I had then the material and the time I would certainly have continued my observations and extended the limits of the genus, which has grown to unexpected dimensions in Prof. Smith's work.

In my Revised Check List I accepted several forms as varieties which Prof. Smith shows to be distinct species, thus reverting to my original opinion respecting them which I had incorrectly modified from information received subsequently. With regard to these and to the representative species, now definitely separated as distinct upon distinctions found in the male genitalia, Prof. Smith's observations may be accepted as corrections of my list. It is not my intention here to review the whole of Prof. Smith's brochure, merely to point out certain misapprehensions and, as I think, wrong identifications, which in the future, if uncorrected, may render the synonymy uncertain. Similarly I avoid any reply which might take the shape of controversy, confining myself to matters of fact, as I understand them, and referring the student to my published papers for all special cases of difference.

A prominent feature in Prof. Smith's treatment of the species is his referring names designating recognizable varieties as simple synonyms. Even when intermediary forms exist, as they do in very many cases of variation, the names for the extremes for the pronounced varieties, should be retained to designate them exactly. Colour varieties, as for instance the bright red *specialis*, in contradistinction to the olive-grey *Wilsoni*, *gularis* as distinguishable in a similar way from *ochrogaster* (*turris*), might, with advantage, be designated. In a few instances where the differences remain, in my opinion, of specific value, the names are made equally synonyms. The most prominent instances of this are

Clodiana, Essay fig. 10, and *semiclarata*, Essay, fig. 9. This latter is smaller and slighter, bright reddish-brown, with a thick black basal dash absorbing the long claviform, the hindwings dark above, beneath half-pale. The former is stouter, obscure purplish-brown with a yellow tinge, the male with yellow streaks; the claviform is reduced, no black basal dash, hindwings soiled white with diffuse terminal shadings, beneath wanting the character of *semiclarata*; the female is still more obscure, the markings of primaries lost. The differences between these two forms seem certainly specific. In the Check List I have besides accorded specific rank to the following names, which in the revision are put down as varieties or synonyms: *Brunneipennis*, *orbis*, *latula*, *cloanthoides*, *balanitis* and *verticalis*. As regards *brunneipennis*, I incline to believe that we may have a second eastern species smaller than *cupida*, and variable in colour. The larger specimens from Texas are published with the use of my description by Prof. Smith, under the name *Belfragei*, and probably this is the correct view. From Prof. Lintner's remarks it seems that *cupida* is more constant in size than I thought it, although more variable in colour.

As to *orbis* and *latula*, they are referred by Prof. Smith as synonyms of *cupidissima*. But what Prof. Smith describes as *cupidissima* is most certainly not that species but *orbis*. *Cupidissima* is really and originally founded on three specimens with open orbicular and faint, shaded markings. A fourth, which had no discernible markings, need not concern us here. I thought it a variety. I cannot account for the statement that I have confounded two distinct species, one with the orbicular open, the other with the orbicular closed. Most assuredly, so far as I can see and remember, and both originally in the CANADIAN ENTOMOLOGIST and subsequently in the bulletin of the U. S. Geol. Survey, I have described *cupidissima* with the orbicular open. On the other hand I had only the type of *orbis*. This is a smooth olive-gray species, with slightly paler terminal field, and which may be held the Californian representative of *alternata*. The orbicular is small, spherical, pale-ringed; the closed round orbicular suggested the name *orbis*. I am quite confident that *orbis* and *cupidissima* are distinct species, while it is almost certain that Prof. Smith has failed to recognize *cupidissima* under my name for it, while both this and *latula* may figure as new species in the section of *Rhyncagrotis* with open orbicular. As to *cloanthoides*, Prof. Smith says *albalis* of Dr. Bailey's collection looks like a washed-out specimen of

cloanthoides. I have no special knowledge now of the specimen referred to, but I believe the Nevada specimens of *albalis* are distinct. The types in my own collection were fresh, with a white bloom, very different from the smooth strigose *cloanthoides* from Colorado, which is darker. There was nothing "washed out" about my material. As to *balanitis* it differs from *messoria* by the abdominal line, the different maculation and course of t. p. line, all specific characters. As to *verticalis*, the fact as to whether it be distinct, or only a constant form of *designata*, must be determined by breeding; I thought it distinct. In other cases, I believe Prof. Smith's large material has enabled him to properly correct the synonymy of the list.

I would certainly retain the name *tricosa* of Lintner. In my New Check List of 1882 I say, in a note to this species, p. 24: "This form should perhaps bear Guenée's name, being later separated from Guenée's *jaculifera* than *herilis*. The typical form of *jaculifera* exactly corresponds to *subgothica* of Stephens." And Prof. Smith, without giving me credit, prefers the name. Mr. Butler says positively, according to Prof. Smith, that *tricosa*, Lint., is typical *jaculifera*. Now Guenée happens to figure typical *jaculifera* and he figures typical *subgothica*! Prof. Smith does not quote Guenée's illustration, which contradicts both Butler's statement and his own course. Guenée's types of "*jaculifera*" or so-called "types," were several in number at least, as he included two other species as varieties. One of these so-called types Mr. Butler may have and this may be a *tricosa*, Guenée's var. A. Guenée made three mistakes as to his material: first he described and figured *subgothica* as *jaculifera*; then he described specimens belonging to two different species, *tricosa* and *herilis*, as varieties of *jaculifera*. Under no circumstances can Butler's statement be correct, while I submit that it is unfair both to Prof. Lintner's acumen in contradicting the conclusions of Guenée and the figures of "The Practical Entomologist," and to an exact interpretation of the names, to resuscitate *jaculifera* at the expense of *tricosa*.

Agrotis morrisonistigma, Grt.—According to Prof. Smith, Mr. Morrison's so-called "type" of this species does not agree with the specimens returned me by Mr. Morrison. The species figured by me as *exsertistigma*, will therefore have to be known by the name *Morrisonistigma* proposed by me in Buffalo Bulletin for this eventuality. The "types" of *exsertistigma*, Morr., came originally from me, and it appears that Mr.

Morrison has distributed different species under this name. As I figure one of these, the name might have been allowed to remain as fixed by me. Since Prof. Smith has overturned my determination of course the above name must be used and not a new one as attempted in the "revision."

In conclusion, *Agrotis costata* is a near and close ally of *idahoensis* and does not belong with the *cupida* group. I have always associated the two, describing in fact the latter comparatively with the former, of which I had but a single poor specimen, though in my lists I have placed the two together wrongly. The description was misplaced, and the words "resembles the preceeding" become thus misleading. But the description is clear enough; it is a species with pallid costa, hence the name. I hope that figures may be obtained of my types in the collection of the British Museum not known to Prof. Smith, so that every point may be cleared up. As these unknown species are, proportionately speaking, few, there should not be any great difficulty in the matter.

DESCRIPTION OF A MUSCID BRED FROM SWINE DUNG, WITH NOTES ON TWO MUSCID GENERA.

BY C. H. TYLER TOWNSEND, LAS CRUCES, NEW MEXICO.

(Read before the Entomological Society of Washington, Feb. 5, 1891.)

On Dec. 14, 1890, I secured from the upper Piney Branch region (District of Columbia) a small quantity of swine dung that had been dropped in the edge of open woods, and seemed to be old enough to contain with probability larvæ or puparia of Diptera. This was placed in a large glass jar, with a few inches of sand in the bottom, occasionally moistened and kept in a moderately cool room in the house. The dung was soon noticed to be full of larvæ, which in a short time crawled out of it entirely, clustered on the inside of the glass, or worked themselves down into the sand, manifesting a considerable migratory instinct, no doubt induced by the moisture and mild temperature. Up to Feb. 1st about a dozen specimens of the perfect fly had issued, there being only one species. It belongs to the genus *Cleigastra* in the *Cordyluridæ*.

This genus, in the sense of Schiner, differs from *Cordylura*, for which it might easily be mistaken, by having the arista naked or only short pubescent, and the wings very distinctly longer than the abdomen.

Cordylura has the arista feathered, and the wings as long as, or shorter than the abdomen, though some of our American species may have them somewhat longer. *Cleigastra* might also be mistaken for an Anthomyiid, particularly of the genus *Cænusia*, to which it bears much resemblance. It may, however, be distinguished from that genus by having six abdominal segments. The *Anthomyiidae* have only four or five abdominal segments, usually four. The eyes of *Cleigastra* also are nearly round, while in *cænusia* they are elongate. A large number of descriptions of North American species of *Cordylura* and *Cleigastra* have been lumped together in the O. S. catalogue under the genus *Cordylura*. Loew described nearly all of these. Reference to these descriptions in most cases shows to which genus they belong. Though the separating characters of the two genera may seem insufficient, the division is warranted by the considerable number of species. There are also in the catalogue one or two errors which should be corrected. I give at the end of this paper a revised list of the N. Am. species of the two genera as they should appear, based on the character of the arista as learned by consulting each description, omitting the repetition of references contained in the catalogue, except two corrections.

Reference to the descriptions of all the N. Am. species failed to identify the present form, which is described below. The breeding of this species as above detailed indicates that the last brood of larvæ may reach full growth at the time winter sets in and hibernate in the larval state in the dung. With the milder weather and rains of spring such larvæ entirely abandon the dung to pupate in the earth. I have specimens of the same genus captured in this vicinity (District Columbia) from the 3rd to the 8th of May. It is extremely probable that many of our coprophagous Diptera winter equally in the larval and pupal state. *Hæmatobia*, *Lucilia* and *Musca* are familiar examples, which I believe may winter either as larvæ or pupæ. In a state of nature the flies themselves rarely winter.

Cleigastra suisterci, n sp.

Imago. ♀. Brownish cinereous. Head brownish or yellowish, nearly round, elongate behind; eyes blackish, round; frontal vitta very dark reddish brown, W-shaped, cleft behind, almost reaching the eyes in front on each side; front very broad, not quite one-half the width of the head, with bristles on each side, and longer erect bristles on the vertex; antennæ not quite

so long as the face, first joint very short, black ; second joint much longer, yellowish ; third joint not twice as long as the second, blackish ; arista black, almost naked, only very short pubescent ; vibrissæ black, strong ; proboscis black, stout ; palpi elongate, club-shaped, light yellowish or reddish, bristly, terminal bristles usually black ; occiput convex, cinereous brown, black bristly on the sides above, gray hairy below ; cheeks and face lighter, sometimes light silvery yellow. Thorax cinereous brown on the sides and below, pubescent on the sides ; darker above, not pubescent, but with black bristles that are longer behind, and four longitudinal, brown, dorsal lines, the outer two sometimes obsolete ; scutellum concolorous, with four black marginal bristles. Abdomen brownish cinereous, black bristly on the borders of the segments, and black hairy on the whole surface. Legs reddish or yellowish ; femora not much enlarged, short bristly, usually largely cinereous ; tibiæ with strong black bristles, especially the hind pair ; tarsal claws black, moderately long. Wings subhyaline, the costal portion slightly tinged with yellowish, especially near the base, the anterior and posterior transverse veins clouded with black ; all the veins blackish, at least toward the apex of the wing, delicate, except the thickened first longitudinal and transverse humeral veins ; tegulæ not large, nearly circular, glassy, with a light brownish border and a long fringe of light hair ; halteres yellowish.

♂. Differs from the female in the front being narrower, but considerably more than one-third the width of the head ; and the abdomen thinly woolly or pilose, without bristles.

Length of body 6 mm. ; of wing 6 to 6½ mm.

Described from one female and three male specimens. District of Columbia.

Larva (full-grown). Dirty yellowish white, long, cylindrical, of equal thickness, tapering slightly at the posterior extremity, more markedly so at the head, composed of 12 segments including the cervical and anal, each segment transversely wrinkled. Head small, corneous, one-half the width of middle segments, irregularly very short ovate in outline from above, light brownish above and below, with a dark brown margin posteriorly both above and below ; above with two light dividing lines diverging from the centre of the posterior margin outward to the antennæ, which appear as short, minute, raised points of a darker color, apparently 3-jointed ; mouth parts dark brown, nearly black. Second segment

(counting the cephalic the first) longer than the head, a little narrower than the third segment, with a deep scallop on the anterior margin above, into which fits the head, forming an anterior lateral dark brown spinous process on each side of the segment; third segment of nearly full width, shorter than the second; fourth and fifth segments of equal length, shorter than the third; segments six to ten nearly equal in length, one and one-half times so long as four and five; segment eleven slightly longer, a little narrower than the tenth; anal segment about one-half so long as the eleventh, in some specimens very light, in others dark brown or nearly black, sculptured, narrowed posteriorly, anterior upper margin raised, posterior portion 4-cleft behind exhibiting a pair of processes above and below.

Length about 8 mm.; width nearly 1 mm.

Described from several alcoholic specimens.

CORDYLURA, Fall., Spec. Ent. etc. CLEIGASTRA, Mcq., Hist. Nat. Dipt.

(1810).

II. 384 (1835).

angustifrons, Lw.

bimaculata, Lw.

confusa, Lw.

flavipes, Lw.

gagatina, Lw.

glabra, Lw.

gracilipes, Lw.

latifrons, Lw.

lutea, Lw.

munda, Lw.

picticornis (not *pictipennis*), Lw.

pleuritica, Lw.

præusta, Lw.

scapularis, Lw.

setosa, Lw.

terminalis, Lw.

vittipes, Lw.

unilineata, Zett.

acuticornis, Lw.

adusta, Lw.

albibarba, Lw.

capillata, Lw.

cincta, Lw.

cornuta, Lw.

fulvibarba, Lw.

gilvipes, Lw.

hæmorrhoidalis, Meig.

impudica, Reiche. Bull. Soc.

Ent. Fr., 1857, p. ix. (not

p. 77).

inermis, Lw.

megacephala, Lw.

nana, Lw.

tricincta, Lw. Centur. IX., 85.

? *variabilis*, Lw.

NOTE.—*Cordylura qualis*, Say, does not belong anywhere in this family.

DESCRIPTIONS OF THREE NOCTUID LARVÆ.

BY HARRISON G. DYAR, NEW YORK.

The moths bred from the larvæ here described were kindly determined for me by Prof. J. B. Smith.

Tæniocampa alia, Guen.

Stage I.—Head shiny, pale yellow; mouth orange; ocelli black; width, .3 mm. The abdominal feet are well developed only on joints 9, 10 and 13, so the larva walks like a Geometrid. Body whitish, appearing green from the food within, with many black, piliferous dots. Joint 12 is a little enlarged; cervical shield coloured like the head, but paler, Length, 4 mm. This larva was found May 3.

Stage II.—Head shiny, whitish; ocelli black; mouth brown; width, .6 mm. Body dark green above, paler below, enlarged at joint 12; the feet on joints 7 and 8 small and unused. A dorsal, subdorsal and stigmatal white line, the latter broad and blending below with the colour of the venter. A number of minute black piliferous dots and a few fine hairs on the head. Length, 6 mm.

Stage III.—Head dull, pale yellowish-white; ocelli black; mouth brown; width, .9 mm. Body as before, the dorsal and subdorsal lines clear cut. In the subdorsal space are two white spots per segment, each with a minute black centre. The feet on joints 7 and 8 are better developed than in the previous stage.

Stage IV.—Head dull pale whitish; mouth faintly brownish; ocelli black, ringed with white; a few pale hairs; it is partly withdrawn under the skin of joint 2; width, 1.6 mm. Body pale, semi-transparent yellow, appearing green. Dorsal, subdorsal and stigmatal white lines, the lowest large and bordered above with dark green. White piliferous dots with minute black centres, about two per segment in each of the spaces. Feet normal, nearly equally developed; joint 12 enlarged. Length, 15 mm.

I think a stage occurs between stage IV. and the last stage, but I have not observed it.

Stage VI. (?), *Last Stage.*—Head green, with a few hairs; marked as before. Body yellowish-green, sprinkled with pale yellow; a yellowish-white dorsal line, a faint and broken subdorsal line and a narrow stigmatal line above the spiracles, except on joints 2 and 12, where it runs below

them, passing into the anal foot. Spiracles white in a narrow black oval. Feet all present. Length, 30 mm.

Pupa.—Cylindrical; the abdominal segments slightly tapering. Cremaster, two thin, sharp divergent spines. Body punctured. Colour red-brown, darker in the sutures on the back. On the dorsum posteriorly to each of the three movable abdominal sutures, and also posteriorly to the one before them, is a transverse row of large deep punctures, becoming smaller towards the sides and not reaching beyond the dorsal half of the body. The wing cases are wrinkled. Pupation occurred in June, and the moth emerged Jan. 10 (in a warm room). It was the form *confluens*, Morr.

Gortyna cataphracta, Grote.

Mature Larva.—Head pale brown, mottled with dark brown, and with a black stripe at the side covering the eyes; mouth parts largely black; labrum pale, narrowly brown above; jaws sharply dentate on the ends; a few hairs; width, about 3 mm. A large, testaceous, cervical shield, edged with black below, and narrowly bisected by a whitish dorsal line. Body whitish, with a dull purple stripe in the subdorsal spaces, obsolete anteriorly; another more extensive lateral one, and traces of one in the subventral space. A number of brown-black blotches in two irregular transverse rows per segment, varying in size. Anal plate testaceous, shaded with blackish at the sides. Thoracic feet and spiracles black. Length, 35 mm. •

Pupa.—Cylindrical; of unusual length in comparison with its diameter; obtusely rounded anteriorly; wing cases moderately prominent. Cremaster short, thick and rounded, with two sharp, divergent spines; cases creased; body segments punctured on their anterior edges. Colour reddish-brown, the body lighter. Length, 20 mm.; width, 5 mm.

Food Plant.—Rhubarb, in the leaf stems of which it bores, pupating in its burrow after biting a hole, across which it spins a few threads.

Hypena (Bomolocha) abalienalis, Walk.

Mature Larva.—Head bilobed, green; the mouth brownish; labrum and antennæ white; ocelli black; width, 2 mm. Body slender, contracted at the sutures, the skin forming distinct folds. Two rows of small warts on the cervical shield, and others on the body arranged much

as in the Arctiidae, except that there are none on the last segment. They are small, purplish, each with a single black hair. Body green, with a white subdorsal band. The feet are normal, divergent, but the larva walks with a looping motion. Spiracles orange.

Pupa.—Formed in a slight web just under the surface of the ground. Cylindrical; the abdominal segments tapering; wing cases very prominent. Cremaster, two curled, knobbed, slender spines, surrounded at base by several smaller knobbed spines. Wing cases coarsely creased; body punctured. Colour dark red-brown, the cases almost black.

Food Plant.—Slippery elm (*Ulmus fulva*). The larvæ rest on the leaves, but throw themselves violently off with contortions if disturbed.

This, as well as the two preceding species, from Dutchess Co., New York.

NOTES.

HALISIDOTA TRIGONA, GRT.

Mr. Dyar's note and Mr. Grote's reply, concerning the identity of the above species with *specularis*, H.-S., may make further notes interesting. Mr. Hy. Edwards informed me two or three years ago that Mr. Grote had redescribed Herrich-Shaeffer's species, and that he had a specimen. I suggested that he should print this note, and he promised to do so in connection with a number of other remarks on Bombycid species. The notes were not printed, and I made no reference to the matter in my catalogue. After Mr. Dyar's note appeared, Mr. Butler wrote me at some length giving the differences between the tropical species and North and South American forms, and mentioning others which he thought formed a distinct section at least of the genus. I saw Mr. Edwards afterwards, and stated Mr. Butler's indisposition to accept *trigona* as = *specularis*. Mr. Edwards adhered to his original conclusion, and fortified it by stating that he had examined and compared the specimens in the British Museum, and felt sure he was right. The existence of several closely allied species is indicated by specimens in Mr. Neumoegen's collection, and it would seem to be hazardous to unite species from a comparison of a picture and description merely. Mr. Edwards's comparisons, made in the British Museum, stand on quite a different base, but we must wait until he gives us his notes before putting *trigona* into the synonymy.

J. B. SMITH.

DASYCHIRA LINTNERI, GRT.

Recently on a visit to Plattsburgh, N. Y., I noticed in the collection of my friend, Mr. G. H. Hudson, four specimens of a *Gluphisia* new to me, similar to *G. trilineata* but larger and stouter, and with a yellow shade preceding the subterminal line. These were taken by Mr. Hudson as follows:—April 13th, 1890, 1 ♂; April 23rd, 1890, 3 ♂ ♂. I compared the descriptions of all our species of *Gluphisia* without finding anything to fit, but later found the species in the collection of Prof. Lintner under the label "*Dasychira Lintneri*, Grt.," and Mr. Grote's description fits the specimen exactly. From the above it will be seen that the species must be referred to *Gluphisia*, and will stand thus: *Gluphisia Lintneri*, Grt.

1877—Grote, CAN. ENT., IX., 85, *Dasychira*.

The venation is that of *G. trilineata*; three median venules; the subcostal series crowded well toward the apex of the wing; the independent vein of secondaries absent, but represented by a strong fold which runs to the base of the wing. It is very different from that of *Dasychira*, and it is somewhat curious that Mr. Grote should have been led to refer it to that genus, differing as it does in subfamily characters.

HARRISON G. DYAR, New York.

AGROTIS SUBGOTHICA, HAW.

Mr. Grote in his "Check List of N. American Noctuidæ," 1890, treats this as a distinct species. I do not know the American *subgothica*, which is, I dare say, a distinct species; but why is it *subgothica*, Haw.? I think there can be no doubt that Haworth's description applies to a well-known variety of *Agrotis tritici*, and, therefore, unless the American species is also a var. of *A. tritici* I fail to see how it can be called *subgothica*, Haw., at all. It should, in my opinion, be *subgothica*, Grote. Mr. A. G. Butler has followed this nomenclature, "Trans. Ent. Soc.," 1889, p. 377, and looks like landing us into a muddle. I drew his attention to this and other errors in the "Entomologist's Record," etc., 1890, p. 10, and on p. 31 Mr. Butler simply falls back on Grote's "Check List" as his authority without attempting to combat my view that *subgothica*, Haw., is not *subgothica*, Grote. Perhaps Mr. Grote will tell us what he knows of *subgothica*, Haw., other than as a well-recognized var. of *tritici*.

J. W. TUTT, Westcombe Hill, London, England.

BOOK NOTICE.

THE BRITISH NOCTUÆ AND THEIR VARIETIES, by J. W. Tutt, F. E. S.:
Sevan, Sonneuschein & Co., Paternoster Square, London, E. C.:
Volume I., 164 pages, May, 1891.

This book is characterized by the extreme care which the author has taken in describing and fixing the original form which was taken as the basis for the first specific description, and the enumeration and designation of all the varieties of the species hitherto known. It is simply invaluable to the English collector, and has in so far an interest for the American, as the species common to Europe and America are fully treated, and it is a matter of scientific importance to ascertain whether all the varieties of such species occur equally in both the Old and New World, or what varieties are peculiar to either. For clearness of treatment and precision of language the work cannot be too highly spoken of. Whether all the named varieties are constantly recurring, and sufficiently recognizable in every case is a matter for future elucidation; but it is undeniable that it is a matter of convenience that the varieties should receive special designations. In this way what are commonly called synonyms have a use in designating the particular form which they were originally intended to cover and the geographical distribution, and the occurrence of these varieties can be properly brought to light. Where a work has been prepared with so much evident care, and contains so many valuable scientifically-stated suggestions as to the phenomena of variation itself, it disarms any unfavourable criticism. It seems, however, a matter of regret that the generic terms employed are not the most correct in a number of cases, that the system of M. Guenée has been retained, and, lastly, that no account is made of possible variation in structure, neurulation, armature and secondary characters. The work is well printed and will be of interest, and is hereby cordially commended to the notice of all lepidopterists.

A. R. GROTE.

* * * By some oversight the name of MR. HARRY CARTER was omitted from the list of members of the Geological Section of the Entomological Society of Ontario (p. 108). As he is a very useful and active member, we regret the omission very much.

Mailed July 4th.

The Canadian Entomologist.

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No. 8.

NOTES ON NORTH AMERICAN CHERNETIDÆ.

BY NATHAN BANKS, ITHACA, N. Y.

The North American genera of *Chernetidæ*, so far as recognized, may be separated by the following table:—

1	Cephalothorax with a transverse suture ; mandibles small (<i>Cheliferinæ</i>).....	2
	Cephalothorax without a transverse suture ; mandibles larger (<i>Obisinæ</i>).....	3
2	Four eyes.....	<i>Garypus</i>
	Two eyes.....	<i>Chelifer</i>
	No eyes.....	<i>Chelanops</i>
3	Mandibles with apophysis or stylet....	5
	Mandibles without apophysis.....	4
4	Fingers straight ; cephalothorax wider in front than behind	<i>Chthonius</i>
	Fingers curved ; cephalothorax narrower in front than behind	<i>Obisium</i>
5	Eyes inconspicuous or absent.....	<i>Atemnus</i>
	Four distinct eyes.....	<i>Olpium</i>

The two subfamilies may, I believe, be farther separated by the fact that the *Cheliferinæ* have the dorsal scutæ of the abdomen divided by a median line ; while in the *Obisinæ* the scutæ are entire. *Chernes pallidus*, Banks, which was described as having the median line wanting, really has a median line, though on account of the light colour of the abdomen it is very difficult to trace. The *Cheliferinæ* have an apophysis or small stylet near the end of the mandibular finger. In the more typical *Obisinæ* this is lacking, but in *Atemnus* and *Olpium* it is present. Clubbed hairs are frequently present in the *Cheliferinæ*, while they are not found in our forms of *Obisinæ*.

Chelifer, Geoff.

In this genus the palpi are usually much longer than in *Chelanops*. A new species from Florida may be called

Chelifer floridanus, nov. sp.

Length, 2.3 mm. Colour, dark reddish brown; palpi very long, second joint with a swollen projection behind bearing two spinous processes; third joint (femur) very slender, with the pedicel somewhat distinct, twice as long as the cephalothorax is broad at anterior furrow; fourth joint a little shorter than the preceding one, very much larger at the tip than at base; claw not near as long as second and third joints together; hand not broad, fingers not much longer than hand; palpi, except fingers, with clubbed hairs. Cephalothorax granulated, with larger rounded bodies scattered over its surface; a few spines on each side. Abdomen about twice the length of the cephalothorax, widest behind the middle; lateral ends of the scutæ projecting behind and pointed; scutæ separated by a narrow line, wider behind; body with clubbed hairs. The palpi are very much longer and slenderer than in any other described American form; the tip of the fourth joint reaches much beyond the end of the abdomen. Southern Florida, E. A. Schwarz. A peculiar form from Texas may be called

Chelifer texanus, nov. sp.

Length, 2.5 mm. Colour, abdomen and legs whitish or yellowish; dorsal scutæ brownish yellow; cephalothorax and palpi reddish, not very dark. Palpi short; second joint gibbous behind, with a longer pedicel than usual; third joint distinctly pedicellate, inner margin nearly straight, outer margin convex, not over twice the length of the second; fourth pedicellate, a little shorter and larger than the preceding, inner margin strongly convex, outer margin slightly so; hand oblong oval, not very broad, and longer than the fingers. Palpi furnished with very small and delicate clubbed hairs, except on the fingers. Cephalothorax tapering and rounded in front, with delicate clubbed hairs, no spines, no larger granules. Abdomen oblong, dorsal scutæ narrowly separated by a line, with both clubbed and simple hairs.

In some points of structure this species resembles a *Chelanops* more than a *Chelifer*, but the eyes are well developed; the palpi are shorter than usual in *Chelifer*, and the dorsal scutæ do not cover the abdomen as completely as in most *Chelifers*. Brazos Co., Texas.

Chelanops (Chernes).

As shown by Simon *Chernes*, Menge is *Chelanops*, Nicolet. A new species from Long Island may be described as follows :—

Chelanops tristis, nov. sp.

Length 2. mm. Colour pale reddish-yellow, soft parts white. Second joint of palpi with two projections behind ; third joint pedicellate, nearly cylindrical, twice as long as second ; fourth scarcely shorter than the third, pedicellate, inner margin very convex ; hand, pedicellate, broad, inner margin very convex, outer but slightly so ; fingers as long as hand, curved ; whole palpi furnished with only simple hairs. Body with simple hairs and a few somewhat clubbed ones near the anterior part of the cephalothorax. Legs nearly white. Abdomen oblong oval, dorsal scutæ widely separated, the dark spot much nearer the inner than the outer end. On the sea shore of Long Island, New York.

The described species of *Chelanops* may be separated by the following table :—

1	{ Palpi with clubbed hairs.....	2
	{ Palpi with only simple hairs.....	3
2	{ Palpi as long as body, large, very pale.....	<i>pallidus</i> .
	{ Palpi not as long as body, small, dark.....	<i>sanborni</i> .
3	{ Fingers almost one-half shorter than hand.....	<i>acuminatus</i> .
	{ Fingers as long or scarcely shorter than the hand.....	4
4	{ Dark spots in dorsal scutæ much nearer median than lateral end, scutæ widely separated.....	<i>tristis</i> .
	{ Dark spots at about the middle of dorsal scutæ, scutæ narrowly separated.....	<i>oblongus</i> .

Garypus, Koch.

In this genus the cephalothorax is quite suddenly narrowed in front of the eyes. It has not been recorded from the U. S. Several specimens of a species of this genus were found at Ithaca, N. Y., in the crevices of a rocky cliff. The form may be described as follows :—

Grypus granulatus, nov. sp.

Length, 1.7 mm.; colour, abdomen yellowish, legs white, palpi and cephalothorax pale reddish. Palpi longer than the body ; second joint short, very convex in front ; third not very long, short pedicellate, gradually growing thicker ; fourth predicellate, shorter than the preceding,

becoming near end a little larger than the femur ; claw about as long as femur ; hand not very broad, tapering towards base of fingers, which are a little shorter than the hand, and curved. Palpi, except fingers, granulated, and provided with simple hairs. Cephalothorax distinctly narrowed in front of eyes, anterior margin straight. Abdomen broad, seven scutæ separated by a line, first scuta not divided. Legs short, hind legs not very stout. Cephalothorax and scutæ of abdomen granulated, with simple hairs. The eyes slightly projecting and almost touching. Legs granulated, hind pairs but little larger than front pairs. Found in crevices of a cliff at Ithaca, N. Y.

Chthonius, Koch.

The species of this genus are seldom taken in houses. They are not rare under wet or damp leaves in the woods. They can move quite rapidly. Three species have been described from the U. S., two of them from caves. The description given by Hagen for *Chth. pennsylvanicus* was quite short. A fuller description of this and two other forms may be added.

Chthonius pennsylvanicus, Hagen.

Length, 1.9 mm. Colour, brownish with scattered silvery spots on abdomen, mandibles reddish, palpi pale reddish, legs white. Palpi slender, longer than the body ; third joint (femur) reaching one-third its length beyond the cephalothorax, nearly cylindrical, slightly narrowed in middle, largest near tip ; fourth joint about one-third the length of the third joint ; hand not broad, tapering towards base of fingers, the latter straight about one and one-half times length of hand ; femur longer than fingers. Mandibles very large, about as long as cephalothorax. Cephalothorax much wider in front than behind, about as wide in front as long. Hind eye about twice its diameter from front eye, which is about on the front margin. Abdomen narrow at base, becoming broader near tip, twice as long as cephalothorax. Hind pairs of legs very much larger than front pairs ; fourth pair much longer than body, tip of femur nearly reaching to the end of abdomen. Penn., N. Y.

Chthonius longipalpis, nov. sp.

Length, 1.9 mm. Colour pale yellowish, fingers and claws of mandibles a little reddish ; cephalothorax and scutæ slightly brownish, abdomen with scattered silvery spots. Palpi long and slender, longer than body ; femur very slender, slightly largest near tip ; fourth joint short, conical ; claw slender ; hand narrow, tapering toward base of fingers,

which are straight and a little longer than hand; femur longer than fingers. Mandibles large, not quite as long as cephalothorax. Cephalothorax not much wider in front than behind, not near as much so as in *Chth. pennsylvanicus*; hind eye about once or one and one-fourth its diameter from front eye, which is a little separated from anterior margin of cephalothorax. Abdomen narrow at base, growing wider near tip, end rounded, more than twice the length of the cephalothorax. Hind pairs of legs larger than front pairs; hind legs extending beyond abdomen, but the tip of the tibiæ rarely reach the end of the abdomen. Under leaves in woods, Long Island, N. Y.; Ithaca, N. Y.; Washington, D. C.

Chthonius moestus, nov. sp

Length, 1.3 mm. Colour, more reddish than preceding, silvery spots not as distinct. Palpi short not reaching end of abdomen; femur short, cylindrical; fourth joint conical; hand very short, fingers straight, about twice the length of hand, about as long as femur. Mandibles large, tapering, not as long as cephalothorax. Cephalothorax quite a little broader in front than behind, more so than in *Chth. longipalpis*; eyes close together, about touching. Hind pair of legs short, not reaching beyond abdomen. Ithaca, N. Y., under stones in spring.

The described species of North American *Chthonius* may be separated by the following table:—

1	{ Cave species, two or no eyes	2
	{ Not cave species, four eyes	3
2	{ Hind legs about twice as long as the abdomen.....	<i>packardi</i> .
	{ Hind legs not much longer than the abdomen.....	<i>coecus</i> .
3	{ Eyes close together, almost touching.....	<i>moestus</i> .
	{ Eyes distinctly separated.....	4
4	{ Hind eyes about twice its diameter from front eye, ceph. much wider in front than behind.....	<i>pennsylvanicus</i>
	{ Hind eye not twice its diameter from front eye, ceph. but little wider in front than behind	<i>longipalpis</i> .

Atemnus, Can.

The eyes in this genus are indistinct or wanting; the mandibular apophysis is present, the dorsal scutæ softer than usual, and the fourth joint of the palpi is longer than is usual in the *Obisinae*. A species from California may be called

Atemnus californicus, nov. sp.

Length, 2.1 mm. Colour, cephalothorax and palpi reddish-yellow, abdomen and legs nearly white. Cephalothorax longer than broad, sides

nearly parallel until just before the anterior margin where they converge slightly, anterior margin very obtusely angled. Mandibles about half the length of cephalothorax, finger with a small and weak apophysis. No eyes. Cephalothorax smooth. Palpi very long; the basal joint narrower than usual; second joint slender, as long as mandibles, a very small, conical projection on outer side near distal end; third joint (femur) slender, nearly as long as cephalothorax and mandibles together, not pedicellate, gradually growing thicker from the base; fourth joint a little shorter than the third, very long pedicellate, pedicel almost one-third the length of the joint, gradually growing thicker, both sides convex, the outer more convex toward the distal end, the inner more convex toward basal end, broader than femur; hand quite long pedicellate, oblong oval, not very broad; fingers much longer than hand, curved toward the tip, with a great many very fine teeth; inner side of femur and inner side of hand and base of fingers granulated. Body and appendages with simple hairs. Abdomen wider than cephalothorax, widest behind the middle, not very long; hind legs long, reaching much behind the abdomen, other legs a little longer than usual. California, Dr. Cooper Curtice.

Olpium, Koch.

This genus is related to *Atemnus*, but has distinct eyes. It has not been recorded from U. S. A species from the District of Columbia may be called

Olpium rufulum, nov. sp.

Length, 2.5 mm. Colour, cephalothorax and palpi red, dorsal scutæ yellowish, legs white, venter yellowish. Palpi slightly longer than the body, second joint with a small obtuse projection behind; third joint (femur) pedicellate, about as long as cephalothorax, nearly cylindrical; fourth joint shorter, long pedicellate, both sides convex, inner side more convex toward base; hand pedicellate, nearly as long as fourth joint, not very broad, tapering slightly toward base of fingers; fingers curved, as long as hand; femur and part of hand finely granulate. Cephalothorax smooth, one and one-half times as long as broad, sides nearly parallel, slightly contracted in front of eyes, anterior margin a little convex; eyes close together, anterior eye about its diameter from anterior margin; mandibles not one-half the length of cephalothorax, apophysis slender. Abdomen about one and three-fourths the length of cephalothorax, not much wider, widest in middle; fourth pair of legs about reaching end of abdomen. Body and appendages with long simple hairs.

Under a large stone, Washington, D. C., March.

ADDITIONS TO THE CANADIAN LIST OF MICRO-
LEPIDOPTERA.

BY J. ALSTON MOFFAT, LONDON, ONT.

As I was in the habit of sending to the authorities, for determination, only such as I had in duplicate, thereby avoiding the inconvenience of returning them, and retaining single specimens of a kind as a reminder of what to look for, and in most cases where to look for them, I found that in Micros single specimens accumulated rapidly. Having changed my location, I wished to finish up with the old material and begin anew. So as a means toward that end, I sent to Prof. C. H. Fernald 80 specimens that I had been unable to identify, with the understanding that he was to retain such of them as he desired. I regret that there seems to have been so little of value to him amongst them, as evidenced by the few that he did retain, to reward him for the time, trouble and thought that he must have expended on them, which is mildly disclosed in the remark appended to the list of names that he sent to me, "They are an interesting but difficult lot."

As was to be expected in such an accumulation, some turned out to be variations of old forms, others merely better specimens of some already known by name, whilst others were so poor as to render them unfit for determination; and some proved to be partially or wholly unknown to him. After discarding all pronounced too poor to determine, and placing in position those already known, we have the following 30 names added to our list, and their representatives to the Society's collection (excepting one):—

Botis oscitalis, Grote.

" *manalis*, Led.

Hydrocampa proprialis, Fern.

Lipocosma fuliginosalis, Fern.

Homophysa glaphyralis, Guen.

Toripalpus lunulalis, Hulst.

Acrobasis palliolella, Ragonot.

Ambesa walsinghami, Rag.

Euzophera semifuneralis, Walk.

Canarsia hammondi, Riley.

Peoria hæmatica, Zell.

- Teras effractana*, Frol.
" *hastiana*, Linn.
Lophoderus afflictatus, Wlsm.
Idiographis inopiana, Haw.
Eccopsis atrodentana, Fern.
" *malana*, Fern.
Sericoris instrutana, Clem.
Pædisca junctiliana, Wlsm.
" *abbreviatana*, Wlsm.
" *solicitana*, Walk.
Semasia ferruginana, Fern.
" *argutana*, Clem.
Proteoteras æsculana, Riley.
Phoxopteris subæquana, Zell.
Mellisopus latiferreana, Wlsm.
Dichrorampha incanana, Clem.
Cryptolochia querciella.
Gelechia purpureofusca, Walk.
" *inscripta*, Wlsm.

Then there are besides, one species of *Lophoderus* undetermined; three *Eccopsis*, three *Semasias*, two *Phycids*, three *Pædiscas*, and one *Penthina*, with eleven where the genera was uncertain or unknown.

Amongst the old names received is *Sericoris coruscana* and *constellatana*. *Coruscana* is in the Society's printed list; *constellatana* was first published as Canadian, so far as I know, in Mr. H. S. Saunders's list of captures at electric light in 1886. CAN. ENT., Vol. XIX., No. 2. It is a common and abundant species wherever I have collected, in its season, and tolerably constant, varying slightly in depth of shading. I have seen both names in collections when I have thought it looked like two names for one species. I had a specimen that differed somewhat from the ordinary in the markings; I put it in the box, and that is how I got the name at this time. Prof. Fernald detected two specimens of *coruscana* in this lot. It is distinctly different from the other and must have been very rare where I have collected, as it was wholly unknown to me; so that it seems extremely probable that the name on the Society's list should have been *constellatana*, instead of *coruscana*, and Canadian collectors would do well to take note of it.

NEW NORTH AMERICAN HOMOPTERA.—III.

BY E. P. VAN DUZEE, BUFFALO, N. Y.

Lamenia Californica, n. sp.

Form and size of *L. vulgaris*. Black, shining, densely pruinose; head, pectoral pieces, and legs fulvous. Length, 4 mm.

Front but little wider across the middle than next the vertex. Head fulvous, tinged with brown on the vertex, apex of the clypeus, margins of the cheeks, and on the front each side of the central carina. Eyes dark brown. Pronotum fulvous, more or less embrowned on the disc; propleura, base of the intermediate femora and the claws dusky or blackish. Elytra as in *vulgaris*, blackish with a row of fine white lines on the transverse nervures at the base of the apical areoles. Plates of the male concave on their inner edges, touching at base and apex only.

This species is very near our eastern *vulgaris* from which it may be distinguished by its fulvous head, pronotum, and pectus, and the form of the plates of the male. In *vulgaris* these are slightly retreating on their inner margins at base, and near the middle exhibit a distinct re-entrant angle.

Los Angeles, California. Described from six examples, all males, received from Mr. D. W. Coquillett. (Nos. 642 and 643.)

Cicadula punctifrons var. *americana*, n. var.

This variety differs from the typical form as follows: Front deeper brown, scutellum with a black spot within the basal angles mostly covered by the pronotum which is there discoloured or marked with a brown cloud; two outer areoles on the clavus and the three inner on the corium blackish, appearing as five oblique blackish vittæ; apical areoles infuscated; nervures of the wings deep fuscous. Other markings and the genital characters as in the parent form.

The apparently constant differences between this and the typical form seem to call for a varietal name, but it could hardly be considered a distinct species. About Buffalo it occurs in great numbers on low willow bushes from June to August. I have taken one example that does not differ from typical European specimens in my collection. It occurred on osiers in company with the variety July 12th, 1889, but does not seem to be common.

Athysanus parallelus, n. sp.

Closely allied to *A. striola*, Fall.; larger and stouter, vertex shorter;

pronotum shorter, its hind edge nearly straight. Colour and markings about as in that species. Length, 6 mm.

Head broad and short; vertex short, fore and hind margins parallel, but feebly arquated, width between the eyes three times the length, disc obscurely longitudinally rugose; face coarsely punctured; front moderately convex, its length and breadth subequal; clypeus oblong, sides straight, at apex slightly contracted; base feebly convex; loræ broad, rounded; outer edges of the cheeks scarcely angled below the eyes, apically margining the loræ and attaining the tip of the clypeus. Pronotum as long as the scutellum, broad anterior margin calloused, behind which is an arquated impressed line, hind edge feebly concave or almost straight. Elytra usually subhyaline, sometimes more or less infuscated toward the inner margin, nervures distinct.

Genital characters. Male: Valve slightly longer than the last ventral segment, broad, its apex rounded; plates broad, nearly square across their apex, outer angles rounded, inner edges contiguous nearly to their apex, a little shorter than the valve. Female: ultimate ventral segment a little longer than the penultimate, apical margin nearly straight, with a broad subtriangular central notch, not reaching the middle of the segment, extreme outer corners oblique; pygofers as in *striola*.

Colour yellow, pale on the face, pectus, legs, and disc of the pronotum. Front black, apex, median line and about six arcs on each side yellow; temples black marked with a yellow spot. Eyes, second joint of the antennæ, sutures of the face, median line of the clypeus, and front of the vertex black; ocelli fulvous, connected by a yellow band; posterior disc of the pronotum sometimes obscured. Elytra pale yellowish, inner and apical areoles sometimes smoky, nervures pale. Wings whitish hyaline, sometimes smoky toward their tips, nervures concolorous. Abdomen black; connexivum broadly, the genital and penultimate, and the margins of the ultimate segments, and sometimes the sides of the venter, yellow; sheath of the ovipositor black. In dark examples the outer surfaces of the femora are trilineate with black, and there is a black line on the edge of the anterior and intermediate tibiæ; tips of the tibiæ and tarsal joints embrowned.

Described from one male and seven female examples, all taken near South Falls, on the Muskoka River, Ont., about the first of August. This is the large form of *A. striola* mentioned in my list of Muskoka

Hemiptera, CAN. ENT. XXI., p 11, 1889. But a comparison of the genital characters with a series of *striola* received from Europe shows it to be a well marked species.

The true *striola* is common about Buffalo from July to September on swampy meadows and pasture lands.

Goniagnathus Palmeri, n. sp.

Form of *Pediopsis insignis*; short and broad, punctured, colour uniform deep shining black, tarsi and apical nervure of the elytra rufo-piceous. Length, 4 mm.

Head a little wider than the pronotum, closely punctured; vertex short, very little longer at the middle than next the eye, apex very obtusely angled, passage to the front well rounded; ocelli placed nearly half way from the eye to the apex of the forehead; front convex about one-sixth longer than wide, sides pretty regularly arquated, suddenly contracted at the apex, disc each side with a large smooth area crossed by about eight irregular rows of punctures; clypeus narrowed from its rounded base, (its apex?) loræ broad; cheeks broad, prominently angled a little below the eyes; antennæ small, incerted beneath a feeble oblique ledge. Pronotum long, almost semicircular in outline, latero-posterior margins long, hind margin moderately concave; surface coarsely punctured, irregularly so on the disc, anterior submargin with an interrupted transverse impunctured band across its whole width; narrow hind margin impunctured. Scutellum acute at apex; anterior field coarsely punctured, disc with a finely punctured area each side of the middle; posterior field transversely wrinkled, with a few scattering coarse punctures. Elytra but little longer than the abdomen, oblique at tip, thick and coreaceous, smooth; all the areoles circumscribed by a single row of coarse punctures; apical areoles five, short, subequal; antiapicals three. Inner edge of the posterior femora somewhat expanded apically in a small rounded lobe; basal joint of the hind tarsi thickened. Abdomen stout, last ventral segment of the female longer than the preceding, its hind edge very feebly advanced in the middle; pygofers short, obtusely subtriangular in form, slightly exceeded by the ovipositor.

Colour a uniform deep shining black; apical nervure of the elytra, tarsi, base of the eyes beneath, and the antennal setæ, rufo-piceous.

Described from a single female example taken at Mt. Balsam, N. C., Aug. 1st, 1890, by my friend Mr. W. J. Palmer, jr., of this city, to whom I take pleasure in dedicating this singularly neat and elegant little species. This is certainly a notable addition to the homopterous fauna of this country. It is a remarkably trim compactly built little creature, mimicking very closely the genus *Pediopsis*, from which it differs, however, by all the characters separating that genus from the Jassidæ proper. In its intensely black colour it has few equals in our Jassid fauna. In mounting this specimen the apex of its clypeus was unfortunately covered so its characters cannot be given.

DESCRIPTIONS OF SOME BUTTERFLY LARVÆ FROM YOSEMITE.—I.

BY HARRISON G. DYAR, YOSEMITE, CAL.

Limenitis lorquini, Boisd.

Egg.—Nearly spherical, the base flat ; covered with elevated reticulations from the intersections of which arise short spines. The depressions between the reticulations are rounded. Colour pale green with a silvery lustre. Diameter .9 mm. Laid singly at the extreme tip of a leaf on the upper surface.

First larval stage.—Head rounded, brown, not shiny ; ocelli and jaws black ; a few minute hairs arising from yellowish elevated bases ; width .6 mm. Body slightly enlarged at joint 12 ; feet normal. Colour yellowish, with rows of short conical tubercles, which are largest dorsally on joints 3, 4, 6 and 12 ; some very short and minute hairs. The larva builds out a long perch in continuation of the mid-rib of the leaf on which it rests. It collects a little bundle of bits of leaf, etc., at the base of this perch.

Second stage.—Head rounded, brown, with two paler lines in front converging toward the vertex. It is roughly tuberculate, the tubercles yellowish. Width .9 mm. Body densely tuberculate, each tubercle with several points, beside many minute granulations. General colour dark brown, with a broad, dull ochre, dorsal patch, which widens on joints 3-5 and 8-10. The larva rests on its perch as in the first stage.

Third stage.—Head bilobed, bulging in front, very rough and tuberculated, but the tubercles are not large. Colour nearly black, the clypeus and tubercles paler, the latter tipped with yellowish on the sides

of the head. Width 1.3 mm. Body rough and tuberculated, a pair of short subdorsal tuberculated processes on each joint except joint 2, those on joints 3, 12 and 13 the largest, those on joints 4, 6 and 11 next in size, the others all smaller; other similar smaller tubercles in a double dorsal line and two lateral lines, besides numerous small granulations. Colour black* with a dorsal white patch on joints 8-10, reaching down the sides on joint 9. All the tubercles and granulations are dull yellowish, more especially on joints 2-4. The larva builds no perch in this stage.

Fourth stage.—Head as before, densely tuberculate, the tubercles larger laterally and especially so at the vertex. Colour blackish-brown, darker centrally, the tubercles pale. Width 1.8 mm. On the body are a series of round wart-like prominences covered with tubercles, the subdorsal ones on joint 3 produced into a pair of horns 1 mm. long, while those on joints 4, 11, 12 and 13 are larger than the others. Body densely tuberculate, black with a dorsal white patch as before. All the tubercles are pale brown. Some dorsal cream coloured shades on joints 3 and 4 and a black dorsal dot on joints 8 and 9 each. Indications of a white substigmatal band, especially on joints 11-13.

Fifth stage.—Head bilobed, the apices produced, rough and tuberculated as if covered with warts, higher than wide and depressed along the median suture. Colour dull olive-brown, the excrescence paler; ocelli black; mouth dark. Width 2.8 mm. The body is enlarged dorsally at joints 3, 4 and 6; on joint 3 is a pair of subdorsal horns, roughly tuberculated, 2 mm. long. On joints 4, 6, 11, 12 and 13 are small subdorsal tubercles, the largest on joint 13, and close together. A number of small, round, smooth, elevated bluish dots, most conspicuous dorsally on joints 5-7 and 11-13. General colour olive-brown, shading into pale pinkish on joints 2-4, but still partly mottled with the ground colour. On the hump on joint 6 it is pale olive-yellow, except in a dorsal band where the ground colour prevails. A large patch, nearly white on joints 8-10 dorsally, but on joint 8 posteriorly and joint 9 laterally, it contains a few streaks of the ground colour. An irregular, broad, white, substigmatal band on joints 5-13. Spiracles black, pale centrally and encircled by white. The processes on joint 3 and tubercles on joint 13 are blackish-brown; venter mottled with whitish with a medio-ventral nearly white line.

Anal feet elevated in repose and the body humped, the head turned to one side. The larva usually rests on the stems of its food-plant.

Chrysalis.—Eye cases prominent, pointed, thorax keeled; wing cases very large, projecting; on the anterior part of the abdomen dorsally, is a very large circular disk-like projection, its sides somewhat creased. Abdomen tapering, the last segments rounded. Cremaster large, flat, fastened by its numerous hooks in the mat of silk spun by the larva and from which the pupa is suspended. Wing cases and abdominal hump subtranslucent dark olive-gray; thorax dull purplish, mottled with white; abdomen nearly all sordid white but shaded with gray and black dorsally, laterally and in a double broad ventral band. The terminal segments and cremaster are entirely black. Length 25 mm.; thickness through thorax 7 mm.; height of abdominal projection 3 mm.; greatest width through wing cases 8 mm.

Food-plants. — Willow (*Salix*), poplar (*Populus*), choke-cherry (*Prunus demissa*).

The second brood of larvæ probably hibernate in the second stage in the manner usual in *Limenitis*.

ENTOMOLOGICAL FIELD DAY.*

July 4th was a great field day for the entomologists, it having been arranged to meet at Jamesburg, N. J. The societies represented were the Entomological Section of the Academy of Natural Sciences of Philadelphia, the Entomological Society of Philadelphia, the Feldman Collecting Social of Philadelphia, the Brooklyn Entomological Society and the Newark Entomological Society. About forty members were present, among whom were Dr. Henry Skinner, Curator of the Entomological Society of Philadelphia and editor of the Entomological News; Professor J. B. Smith, of New Brunswick; Isaac C. Martindale, of Camden; James Johnson, of Frankford; William J. Fox, Assistant Librarian of the Academy of Natural Sciences; C. W. Johnson, Curator of the Wagner Institute; Dr. Castle, Messrs. Liebeck, Neutze, E. Wenzel, H. Wenzel, Schmitz, Trescher, Hoyer, Bruner, Philip Nell and Philip Laurent, of Philadelphia, and Messrs. Machesney, Angell, Loeffler, Angelman, Sherman, Thompson, Ottolengin, Leng, Merkel, Roberts, Pearsall, Davis, Baier, Hess, Dietz and Sieb, of Newark, New York and Brooklyn.

*From the Philadelphia Public Ledger.

It was feared that the hail storm of the previous evening would somewhat interfere with the pleasures of the day, but the bright sunshine of the early morning brought sunshine into the hearts of the ardent collectors, for Jamesburg is well known to be a favourite collecting ground. The arrangements for the occasion were made by Prof. J. B. Smith, State Entomologist for New Jersey. The party were met at the Jamesburg Station by the gentleman having charge of the extensive cranberry interests near the town, and by conveyances were taken about a mile to a beautiful grove, bordering cranberry meadows, where, after a photographer had secured a picture of the entire party, the day was spent in collecting, ample lunch having been provided. The locality proved to be such that all the divisions of entomological study could be enjoyed. Philip Nell gave his whole attention to Micro-lepidoptera, C. W. Johnson collected the Diptera, W. J. Fox looked after Hymenoptera, a few collected in all the orders, quite a number looked after butterflies and moths (Lepidoptera) exclusively, while, perhaps, the greater portion collected the Coleoptera. Isaac C. Martindale succeeded in making the largest collection of the day of butterflies and moths, as well as a large number of dragon flies (Neuroptera), which seemed to be quite abundant. No complete list of all the collection has yet been made, but the following butterflies were taken:—*Papilio troilus*, *Papilio philenor*, *Colias philodice* and *alba*, *Pieris rapæ*, *Danaïs archippus*, *Melitæa tharos*, *Argynnis idalia*, *cybele* and *myrina*, *Hypophleas Americana*, *Lycæna comyntas*, *Thecla calanus* and *titus*, *Neonympha canthus* and *eurytis*, *Eudamus tityrus* and *bathyllus*, *Satyrus alope*, variety *maritima*, *Pamphila masasoit*, *manataqua*, *verna*, *pontiac* and *metacomet*, which may be considered as a remarkably good catch for one day in one locality. The specimens were in fine condition, and some of them of rare occurrence. The best catch by the coleopterists was the *Cicindela lepida*, a beetle heretofore known only from the seacoast and the vicinity of the salt licks of Illinois.

The State of New Jersey has long been regarded as a good collecting ground for the naturalist in whatever department his studies inclined, and the finding now and then of these rare species in unlooked-for localities adds to her well-known reputation. Professor Smith has given much attention to the insects found to be injurious to the agricultural interests, and has greatly aided the farmer in ridding the farm and the growing crops of destructive things. The cranberry culture has received his

special attention, and his knowledge of entomology has been of great service to cranberry growers. The bogs near Jamesburg are looked upon as being the finest in the State, and the prospect this year is very favourable for a good crop. The berries are just now forming, the inflorescence having been in great profusion. Mr. Martindale identified all the plants that were collected, he having been engaged in botanical study for more than thirty years, and has become familiar with all the species growing in the State. He stated that a belt of country crossing New Jersey diagonally, from Sandy Hook on the coast to near the city of Salem on the Delaware river side, in width about twenty miles, known as the pine barren regions, was the best botanical ground to be found east of the Alleghenies. Many entomologists have not heretofore given sufficient attention to botanical study, but it is now well known that many species of insects feed exclusively on certain plants, and a knowledge of these aids much in the determination of the collector's gatherings.

The Geological Survey of New Jersey, so long in charge of the late Professor Cook, has already published catalogues of the fauna and flora of the State, but there yet remains much desirable work to be done by the careful collector. The late Dr. Joseph Leidy, of Philadelphia, regarded the swamps of New Jersey as the best collecting ground east of the Mississippi Valley, and during the preparation of his memorable work on the Fresh Water Rhizopods made many and frequent visits thither, and thereby greatly enlarged our knowledge of species. The late Chas. F. Parker, of Camden, in company with Mr. Martindale and others, explored all that part of the State lying south of Trenton for botanical specimens. Mr. Martindale has collected the marine flora (sea mosses), and already published the results of his years of study in that department. Mr. Calvert, of Philadelphia, has completed a list of all the dragon flies known to this section. Dr. Henry Skinner has published a list of the butterflies that have been found in the vicinity of Philadelphia. All these greatly aid the student of natural history, and the annual field gatherings of the active entomologists are doing a good work in fostering a more social feeling among the many persons engaged in the study of insect life. No special arrangements were determined upon for another year, but it is expected that the annual gatherings will be continued, and all persons interested are privileged to attend. It was much regretted that Dr. Horn, the eminent entomologist of Philadelphia, was prevented by previous engagements from being with the party.

ENTOMOLOGICAL, AND OTHER MEETINGS AT
WASHINGTON.

The annual programme of the American Association for the Advancement of Science has just been issued. For a fortnight continuously meetings of great scientific interest will be held in Washington. In the whole of America there is no place which can compare with the American capital as a suitable place for such meetings. Not only is it the social and political centre of the Union, but here also are the headquarters of the various government scientific departments. To naturalists objects of great attraction will be the Smithsonian Institution, the National Museum, the Aquarium, the Botanical Gardens, National Zoological Gardens, and many other places of general interest. Several other scientific bodies have arranged to hold their meetings previous to the meetings of the American Association. The American Microscopical Society, Aug. 11-12. The Association of American Agricultural Colleges and Experiment Stations will meet Aug. 12 in the Law Lecture Room of Columbia University. On Aug. 13th the Association of Official Agricultural Chemists will begin its sessions, and a conference of American Chemists will be held on the 17th or 18th. On Monday, 17th, the Society for the Promotion of Agricultural Science will hold its first meeting, and also on the same day the Association of Economic Entomologists, of which our own Vice-President, Mr. James Fletcher, of Ottawa, is the presiding officer for this year. The Entomological Club of the American Association will meet on Aug. 19th. A joint circular has been issued by Mr. Fletcher and Prof. Osborn, President of the Entomological Club, urging entomologists to attend the meetings, and suggesting that papers referring especially to economic entomology might, for convenience, be best presented before the Association, while notes, items, discoveries of scientific interest, etc., might be referred to the Club, and authors are requested to send in beforehand titles of their papers to the proper secretaries, viz.:—

Mr. L. O. Howard, Secretary Association of Economic Entomologists, Washington, D.C.

Dr. C. M. Weed, Secretary Entomological Club, A.A.A.S., Hanover, New Hampshire.

This arrangement, we feel sure, will tend to make both of these meetings more successful, and will allow Entomologists attending to be present at all the sessions of both organizations.

Meetings of the Entomological and Botanical Clubs of the American Association will be held throughout the week.

On the whole the coming meeting of the American Association at Washington promises to be one of the most profitable and enjoyable of any ever held under the auspices of that most successful body.

CORRESPONDENCE.

THOUGHTS ON SPECIES.

Sir,—In considering the value of the structure of genitalia in determining species, we come in direct collision with the old unsettled question, "What constitutes a species?" I believe it to be a simple one, when we remember that there are two ways of using the term, the natural and the artificial. All are agreed that there is no such a thing as genera in nature, and I am fully convinced that there is such a thing as species in nature, which is satisfactorily demonstrated by cross breeding; and that the artificial method of defining species is merely a matter of individual opinion, as to how much difference should be considered enough to make a species. Does the fact stated by Prof. Smith, that "in an entire genus all the species will be practically alike," prove that the character has failed? May it not rather go to show that genus to be composed of just so many artificial species, of one natural species, which I am quite satisfied may often be the case, and, therefore, be a valuable proof of its success?

There are no two opinions of the advantage to be obtained from a reliable test of species. Prof. Smith expresses confidence in the genitalia up to a certain point; given his experience, we might have the same. One of his published investigations convinced me that there must be a great deal in it.

In *Entomologica Americana* for August, 1890, dealing with the *Scopelosomas*, he says, "*Moffatiana* is closely allied in colour and maculation to *Grafiana*, so closely, indeed, that for a long time they were considered identical. * * * The genitalia of *Moffatiana* are of an entirely different type from the other species of the group. * * * This strong difference in species otherwise so nearly allied is remarkable." As I know the history of how they came to be separated, I will give it as confirmatory evidence to the value of that method.

In that famous entomological year, 1877, I took *Scopelosomas* for the first time; they were in great abundance. From the latter part of September to the first day of December I took about 800 moths, mostly *Scopelosoma* and *Lithophane*, the bulk of the *Scops.* being of that form now known as *Moffatiana*. I had noticed a difference in the depth of shading in the yellow ones, but thought it the result of age and exposure.

In November I visited Mr. Grote in Buffalo, taking with me representatives of my recent captures, and received from him over a dozen names of *Scops.* and *Liths.*, and amongst them *S. Græfiana*. In following years I observed that the yellowish form was just as fresh as the reddish one, and that in some localities one would greatly outnumber the other, and I began to suspect that we might have in these forms different moths. About this time Roland Thaxter, who is now, I understand, entitled to the prefix of Dr., opened communication with me, with a view to exchange; to him I expressed my suspicion, and sent to him an example of the light form as being least abundant with me, and received the reply, that he saw no difference in it from those he took. I then sent him the reddish form; he expressed delight, never having seen the same before, and enquired if Mr. Grote had seen it. I told him that I had got the name from just such specimens.

I supplied him with a good series, and he went into communication with Mr. Grote about it, and it seems with some difficulty succeeded in persuading Mr. Grote that it was deserving of a separate name. And now Prof. Smith, by the examination of the genitalia, finds them widely apart. I, by observing their habits, had suspected this might be the case, but could not prove it, whilst from appearance alone Mr. Grote had failed even to suspect it.

As resemblance is not always proof that they are one, so the lack of it is not a demonstration that they are separate. In the early part of 1890 I had an opportunity of examining an extensive series of *Lithophanes* in the collection of Capt. Geddes, Toronto. I could arrange in line 30 or 40 *Disposita*, *Petulca*, *Ferrealis*, *Signosa*, *Bethunei*, in such a way as to make it appear impossible to tell where the separation should be made. What verdict would the genitalia give in this case? I would expect it to be in favour of their being artificial species of one natural species; yet it may not, but suppose it did? let no one think that I would favour the obliterating of a single name.

J. ALSTON MOFFAT.

BOOK NOTICE.

INSECTS AND INSECTICIDES, by Clarence M. Weed, Hanover, N. H., 1891.

Under the above caption Dr. Weed has published a small volume of 281 pages, well printed and copiously illustrated, which will be found most useful by those for whom it is prepared—the farmer, the fruit grower, the floriculturist, and the housekeeper. The work consists of an introduction and six parts. The introduction gives a concise account of the transformations of insects, which are illustrated by the life history of *Papilio asterias*, the Celery Caterpillar, for those which have a complete metamorphosis, and the Chinch Bug for those which pass through incomplete transformations. The differences between biting and sucking insects are explained, and the natural enemies of injurious insects are treated of. There is then a summary of the different insecticides, and the best methods of applying them. The introduction closes with short instructions for collecting and preserving insects.

Part I. treats of Insects Affecting the Larger Fruits—apple, plum, pear, cherry, peach.

Part II.—Insects Affecting Small Fruits—strawberry, currants, gooseberries, raspberry, blackberry and grape.

Part III.—Insects Affecting Shade trees, the Rose and House Flowers.

(Parts 1-3 of Dr. Weed's work have appeared previously in a small edition issued by the Columbus (Ohio) Horticultural Society.)

Part IV.—Insects Affecting Vegetables—tomatoes, potatoes, celery, squash, cucumber, bean, pea, cabbage, onion, asparagus and rhubarb.

Part V.—Insects Affecting Cereals and Forage Crops—Indian corn, wheat, clover, grass.

Part VI.—Insect Pests of Domestic Animals and the Household.

On the whole this is a very useful and attractive volume, well arranged, easy of reference, and well illustrated. The accuracy and quality of Dr. Weed's scientific work are now too well known to need any comment, further than to say that this his last publication is up to his usual excellent standard.

J. F.

Mailed August 6th.

The Canadian Entomologist.

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No. 9.

NOTES ON COLEOPTERA.—No. 8.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

Panagæus crucigerus, Say.—The living beauty of this beetle is but feebly represented by the dull and faded examples usually seen in collections. Its bright sparkling colours lose their brilliancy onward after life ceases, for which no restorative has yet been discovered. It is not infrequent along the New Jersey coast, occurring sometimes in abundance. The mature insects may be found on Brigantine Beach from the middle of July onward. They are in their greatest abundance about the first of September, at which time they seem to be disclosed. The eggs of many *Carabidæ* are deposited in July and August, and from such, imagoes are produced during the same months of the succeeding year. Individuals of these same and other species hibernate and oviposit in the spring, but their offspring are usually not perfected till the next year. *Panagæus crucigerus*, however, at least on the coast, seems to oviposit in the spring, probably during April, and to disclose the same year about the time mentioned, as appears from observations repeatedly made, one of which is given. Sandy depressions are seen covered in summer two or three inches in thickness with sea trash, below which the ground is damp from capillary attraction, as they are only a few inches above the ordinary summer tides. These are the beds of tidal streams, which, during the winter and spring till near April, are constantly covered with salt water from ocean or bay, many of them being formed during that time, and previously existing ones filled up. On the first of September, on overturning some of the weeds deposited on one of such places, several examples of *P. crucigerus*, too immature for use, were taken, which evidently had been bred where they were found. As this bed had been formed during the winter, of course the eggs from which these insects were derived must have been deposited after March. It was physically impossible for the larvæ to have reached there from other places, because for a long distance around there was nothing but dry and burning sand.

To account for the rapid development it may be stated that these places are inhabited by multitudes of small crustacea and other minute forms of maritime life, so that the food supply of the larvæ is most ample, promoting quicker growth and earlier maturity than occurs in the case of species less bountifully supplied. A couple of weeks afterwards the rest of this place was fully investigated and over fifty well chitinized examples obtained, while many others were seen which were still immature.

This species was described by Mr. Say from a specimen cast alive by the waves on the sea beach of Senipuxten, Maryland, the last of September, and it is now recorded as occurring on the sea coast of New York, New Jersey and Florida ; also Lake Pontchartrain, Louisiana.

Amara fulvipes, Putz.—This beetle was unknown here till recently, when Mr. Klages took a large number in a pasture field, where there were cattle, late in the year (October)—many of them paired. I took it in this city since at electric lights in June, and once in a field in a hilly place later. It probably inhabits the hilly districts along the foot of the Alleghanies. It is decidedly a fine species, belonging among the large elongate forms (*Lirus*). It does not appear to be generally known, or at least is not plentiful enough to appear on an exchange list, while none have been received for identification. In the last two catalogues of European Coleoptera there is an *Amara* (*Triena*) *fulvipes*, Serv., and if my investigations are correct Putzey's species must be renamed.

Bradycellus cognatus, Gyll.—*Tachycellus* appears for the first time in a general European catalogue, in edition IV., just published (May, 1891), and under it is this species. While the first three joints of the antennæ are not really pubescent like those which follow, yet they are armed so thickly with long thick hairs that its removal from *Bradycellus* seems doubtfully justifiable. This species is native in Europe and in Asia, as well as in North America.

Quedius fulgidus, Er.—This beetle has been taken in a more northern latitude than is recorded of any other species. It was found during the voyage of the Alert and Discovery towards the North Pole, 1875-76, at Discovery Bay, in Grant Land, North America, in about lat. 82°. (Linn., Jour. Zoology, XVI., 107.) This beetle is remarkable otherwise for the power it has of adapting itself to a variety of climates, being found likewise in very warm countries, as Asia Minor, Barbary, Java, Tasmania, Australia, etc., in all of which it seems to be native. This world-wide distribution has produced considerable variation, especially in its color-

tion, and it is not well agreed among eminent coleopterists whether there should be one species or two. The form found in Grant Land is stated to have been the common black British form, *mesomelinus*, Marsh.

Tanarthrus salicola, Lec.—This interesting little Anthicide was described from the salt marshes of the Rio Colorado, where it is said to have the habits and activity of a Cicindelide. I saw an example taken by an amateur entomological friend on a salt marsh near Lincoln, Nebraska, which shows the species to be also an inhabitant of the alkaline salt marshes west of the Rocky Mountains.

Leptinus testaceus, Müll.; *Caucasicus*, Motsch.; *Americanus*, Lec.—This curious beetle, which is blind, is known to be native in Europe and Western Asia, as well as in North America. Its consideration here is chiefly intended to present at one view what is known of its habits and what has been written about it, with the view to ascertain more nearly its mode of life. The chief bibliographical references in American literature are :—

1. Proc. Acad. Nat. Sci., Phil., 1866, 367. Described by Dr. Leconte, under the name *Americanus*, from examples found by Dr. Brendel at Keokuk, Iowa, under a log, in a mouse nest.

2. Classification of the Coleopt. of N. A., 1883, 77. "Lives with various small rodents and insectivora, either on their bodies or in the material of their nests, but whether as true parasites or merely as guests has not been determined."

3. Proc. Ent. Soc., Washington, I., 16, 1884. "Known to be parasitic only in the imago state."—*Schwarz*.

4. Insect Life, I., 200. Prof. C. V. Riley states that the larvæ and imagoes had been found around Washington in the nests of *Graphops*.

5. Scientif. Amer. Suppl., XXV., 10356, June 1888, and re-printed in Insect Life, I., 306. "It is known to be parasitic on mice, as it has been found upon them in Philadelphia by Dr. John A. Ryder, and I have taken it in the nests of a common field mouse near Washington."—*Riley*.

6. Proc. Ent. Soc., Wash., II., 2. "Parasitic on wood mice and on other small rodents."—*Schwarz*. Mr. H. Ulke has also taken this species. Prof. Jerome Schmitt, of St. Vincent College, Westmoreland Co., takes it comparatively frequently, and kindly permits the use of his notes. Nov. 3rd, 1890, one example was taken in a mouse nest under a log, the mouse having just fled; cold and snowing. Many nests of mice were examined by sifting during the winter, but no *Leptinus* were obtained

from them. Feb. 18, 1891, three examples were sifted from leaves drifted against a fence, but not in company with mice. June, 27, under a decaying log in a lot of dry vegetable matter, possibly an abandoned mouse or bumble bees' nest, some 50 or 60 specimens were obtained. July 3rd, under circumstances similar to the last, about a dozen examples were found. August 10th, a single example was found on Chestnut Ridge (one of the Alleghanies) under a stone where no nest nor mouse far nor near could be found. The result of Mr. Schmitt's collecting shows that *Leptinus* may be taken at any season of the year. It also shows that it is not wholly dependent on mice or mice nests for its food, as of the five captures it only occurred once with a mouse. All previously recorded captures were made in the nests of this rodent, which has given rise to the expression: "*Parasitic in the nests of mice*," etc. The statement that *Leptinus* is parasitic on the bodies of mice is unsupported, except in one erroneous instance, from which all assertions of this kind have probably arisen. The statement in Insect Life cited, that it has been found on mice by Dr. John A. Ryder, proves, on being traced up, to be somewhat erroneous, and it is found, curiously enough, to have been a mole—and dead—on which it occurred, perhaps much in the way a *Cercyon unipunctatum*, a *Silpha*, *Choleva*, etc., might have been there.

That *Leptinus* is not a parasite seems to have been the opinion of some distinguished European authors, among them, Mr. A. Fauvel, who published a paper on the subject in 1863, in *Annales. Ent. Soc., France*, of that year, in which he states that this insect is found under dead leaves, in leaves in hollow logs, under logs, stones and roots, and thinks, with Fairmaire (cited), that the opinion that they are parasitic on or with rodents is erroneous; advancing the conjecture that they feed on small fungi, like most *Choleva*, *Agathidium*, *Oxypoda*, *Tachyporus*, etc., the decaying leaves and mosses of the nests of rodents often furnishing supplies of this small vegetation accounting for their presence there. If Mr. Fauvel is correct in this surmise, it would be only in line for them to resort occasionally to a carcass for food, if in its vicinity, as is the well-known habit of many insects which live on decaying matter and low forms of life, thus accounting for their presence on a dead mole, as found by Dr. Ryder. Whatever may be the nature of its food, from the foregoing it is evident it can and does live independent of animals, and that the proper term to apply to it in its relation to rodents would, perhaps, be frequently inquilinous. In Europe the distribution of *Leptinus* is, Germany, France, Sweden, Caucasus; in America, that mentioned above.

But, were the country collected over by the mode employed by Professor Schmitt, without doubt it would be found to be a common and widely distributed species.

Agabus (Colymbetes) discolor, Harris, New England Farmer, 1828, 164.

A. (C.) phaeopterus, Kirby, Faun. Bor. Am., 1837, p. 70, No. 102.

A. (C.) phaeopterus, Kirby (Mann.), Bul. Nat., Ges. Mosc., 1853, 159.

A. discolor, || Lec., An. Lyc. Nat. Hist., New York, V., 204, 1852.

A. obliteratus, Lec., Smith, Cont. XI., 5, 1860.

A. (Gaurodytes) Lecontei, Horn, pro. *A. discolor*, || Lec., Tr. Am. Ent. Soc., IV., 417.

These forms have been heretofore united and disunited in a variety of ways, and what appears to be the true synonymy seems at present a little clouded.

Discolor, Harris, has in the Munich catalogue for a synonym *phaeopterus*, Kirby, but the reading of the descriptions shows this to be an error.

A. phaeopterus, Kirby, was described from examples taken in lat. 54°. A form determined by Mannerheim to be this species was taken in Alaska. *A. discolor*, || Lec., was described from California, and *obliteratus*, Lec., from Kansas.

In Dr. Leconte's List of North American Coleoptera, 1863, p. 17, these forms are tabulated thus:—*A. obliteratus*, Lec. (? *phaeopterus*, Kirby, *discolor*, || Lec.), which means that the last two are considered identical, and in case of the identity of *obliteratus* and *phaeopterus* the latter would have the precedence.

That *discolor*, || Lec., and *obliteratus* are quite distinct has been satisfactorily shown by Mr. Crotch, l. c.; and it now remains to show the identity of *phaeopterus*, Mann., and *discolor*, || Lec. In 1854, Dr. Leconte sent a large number of Pacific Coast species to Motschulsky for comparison with the types of the Russian authors, and in the autographic letter of Motschulsky, now in my possession, containing the results of his comparisons, dated Jan. 26th, 1855, is written of this species: "*Agabus discolor* est d'après, Mannerheim, *Ag. phaeopterus*, Kirby." This, therefore, would seem to settle the identity of *discolor* and *phaeopterus*, Mann., which Mannerheim in some way came to regard as Kirby's species. Dr. Leconte, in his List, l. c., appears to have acceded to this. But when in Europe, in 1870, after an examination of Kirby's types, and giving a short description of the male and female, merely says of this and *A. bicolor*,

Kirby: Both species are allied to *A. discolor*, Proc. Acad. Nat. Sci., Phil., 1873, 326. The foregoing discussion seems to warrant the following synonymy:—

Agabus discolor, Harris, Massachusetts, (seemingly unknown).

A. phaeopterus, Kirby, British America; lat., 54°.

A. Lecontei, Crotch; *discolor*, || Lec.; *phaeopterus*, || Mann. California, San Francisco, Vallecitas; ? Alamosa, on the Rio Grande, at 7,600 feet, (differs in being less oval and more parallel, *Lecontei*); Alaska, Peninsula of Kenai, Island of Afognak.

A. obliteratus, Lec.; Kansas, Ft. Laramie, Lawrence; Colorado, Leavenworth Valley at 10–1,1000 feet; Southern Colorado; Northern New Mexico; Wyoming, Lake Como.

A. bicolor, Kirby.—A single specimen was taken by the Richardson expedition at lat. 54°. It likewise occurred in Alaska on the peninsula of Kenai.—*Mannerheim*. While in Europe Dr. Leconte examined ♂ and ♀ types, giving brief descriptions of each (Proc. Acad., l. c.). This appears to be a good species and, with *phaeopterus*, should have a place in our catalogues.

Phaeopterus, *Lecontei*, and *bicolor* seem very close, and their separation by the various descriptions without the presence of examples could not prove very satisfactory.

CERURA SCOLOPENDRINA, Boisd.

I think I have satisfactorily identified this species. I captured a specimen at Yosemite, California, on June 5th, 1891, that bears out Boisduval's description. The specimen, however, is *Cerura aquilonaris*, Lintn., and these names will have to be considered as referring to the same species. I have also received a specimen from Mr. C. A. Wiley, of Miles City, Montana, so the species probably occurs from the Atlantic to the Pacific. The synonymy will stand as follows:—

CERURA SCOLOPENDRINA, Boisd.

1869—Boisduval, Lep. de la Cal., p. 86.

Aquilonaris, Lintn.

1877—Lintner, 30th Rept. N. Y. State Mus., p. 197.

1891—Thaxter, CAN. ENT., Vol. XXIII., p. 34.

It is unfortunate that the rule of priority will not allow us to retain Prof. Lintner's name for this species, since his characterization of it is so careful and exact as to render its recognition easy, which is not the case with Boisduval's description.

HARRISON G. DYAR.

DESCRIPTIONS OF SOME BUTTERFLY LARVÆ FROM
YOSEMITE.—II.

BY HARRISON G. DYAR, YOSEMITE, CAL.

Junonia cænia, Hubn.

Egg.—Spherical, a little flattened at the base, with about twelve vertical ribs running to the micropyle; colour, shining pale green; diameter, .5 mm.

First Stage.—Head rounded, black and shiny; width, .25 mm. Body sordid greenish, with long black hairs curving forward, arising from small lustrous tubercles. Feet concolorous with the body.

Second Stage.—Head bilobed, black and shiny, with a number of hairs; width, .5 mm.; body sordid purplish, almost black, with short black tubercles arranged as in the last stage, and bearing numerous short fine hairs. Cervical shield ochreous; anal plate black. The tubercles on the cervical shield are black.

Third Stage.—Head bilobed, a conical tubercle at the apex of each lobe, shining black with yellow piliferous tubercles; width .95 mm. The body and the series of spined processes, which represent the tubercles of the preceding stage, are black, the former more reddish subventrally. The lateral tubercle on joint 2 is orange, as is also a smaller subventral one on joints 2, 3 and 4 each. As the stage advances a double dorsal and subventral row of white dots appears, and, later, the bases of the substigmatal spines (row 4), and the anal feet become orange tinted.

Fourth Stage.—Head bilobed, bulging laterally, a spined process at the apex of each lobe, pointing forward; colour black, very shiny, with many white conical setiferous granulations; labrum and bases of antennæ, whitish; width 1.8 mm. Body velvety black, the long-spined processes shiny blue-black, a short one above the spiracle on joint 2 and a longer one below it, beside a short stigmatal one on joints 3 and 4, orange. A

geminate dorsal and stigmatal row of white dots, three or four on each segment. Feet all black, the abdominal ones tipped with reddish. The fold of skin behind the head is orange tinted.

Fifth Stage.—Head bilobed, a short spined process from the vertex of each lobe; many conical granulations each bearing a hair. Colour, shining black in front, but largely bright fulvous posteriorly, and at the vertex; a fulvous patch covering the clypeus; granulations fulvous or yellow, processes black; the labrum and bases of the antennæ white; width 2.5 mm. Body velvety black, the long (1.5 mm.) and slender spined processes shiny blue-black, except rows 5, 6 and 7, which are orange, row 7 being pale. The rows are arranged as follows, and correspond to the arrangement of warts in the Arctiidæ (except *Halesidota*), except that the rows on each side of the dorsal line in Arctia (row 1) are here fused to form a single dorsal series:—

No processes on joint 2; a subdorsal and lateral series on joints 3 and 4; a dorsal (1), subdorsal (2), superstigmatal (3) and substigmatal (4) row on joints 5–12; two subdorsal ones on joint 13; two tubercles (5) and (6) above the bases of the legs, and four short ventral spines (7), on the legless segments. A geminate diffuse dorsal series of numerous minute yellow dots, like dust, in which appears later a double dorsal series of segmental dashes; a geminate stigmatal row of large yellow spots, the substigmatal ones almost forming a continuous line, with many minute dots like the dorsal series. The skin behind the head, spots at the bases of spines 3 and 4, and the abdominal legs, reddish-orange; thoracic feet black. Spiracles black, with a pale yellowish border.

Chrysalis.—Of usual shape in the sub-family and without any marked prominences. Eyes large; the depression between the thorax and abdomen slight. Thorax very slightly ridged dorsally, without points; a dorsal abdominal series of very slight points. Cremaster broad, flattened, its hooks fastened in a button of silk. Colour black, not shiny, dotted with white on the back, especially in a series of eight subdorsal white patches, the first of which (over the eyes), and the last two (on the middle and end of the abdomen respectively) are confluent over the dorsum. Length, 17 mm.; width, 6 mm.

ON SOME DESTRUCTIVE LOCUSTS OF NORTH AMERICA,
TOGETHER WITH NOTES ON THE OCCURRENCES
IN 1891.

BY LAWRENCE BRUNER, LINCOLN, NEBRASKA.

(Delivered before the Association of Economic Entomologists, at the Third Annual Meeting, August 17th, 1891.)

In introducing this subject it is my intention to speak shortly upon the various species of Locusts which have appeared in injurious numbers within the territorial limits to be designated with each species. Some of these species have covered a vast area of territory, and have caused extensive injury from time to time, while others have appeared over limited areas only, and have caused but slight injuries; but yet these have been sufficient to necessitate their mention amongst the destructive species of the country. Taking them altogether, we have exactly twelve destructive locusts within the territory designated.

Dissosteira longipennis.—Selecting the species as they occur to me, I will mention first the Long-winged Locust. During the early part of July reports came from the eastern and south-eastern portions of Colorado of locust depredations. The first of these was that trains had been stopped by grasshoppers getting on the rails of the Santa Fe Railroad, 100 miles or thereabouts east of Denver. Shortly after this, reports appeared in the newspapers of serious damage being done around the point where they were first mentioned as stopping trains. About this time other reports of depredations came in from North Dakota and Minnesota and other portions of the west and north-west. On the strength of these reports Prof. Riley instructed me to visit the localities, for the purpose of ascertaining the extent of country overrun, the actual and possible future injury which might result, and the exact identity of the species concerned. Being a Nebraska man, and looking out for first interests, I naturally went to Colorado, the nearest locality to my home from which reports had been received. I first visited Akron, Colorado, the nearest point on the Burlington and Missouri line to the region infested. There securing a team and driving to the south only about six miles, the advance guard of the enemy was encountered. Imagine my surprise at finding here an entirely new insect, as far as destructive locusts are concerned. There in Colorado, and in immense numbers, was the *Dissosteira longipennis*, an insect usually considered rare in collections, and one heretofore only known to occur

over the higher portions of the plains lying to the eastward of the Rocky Mountains, in the States of Wyoming, Colorado and New Mexico. This insect, as ascertained from inquiry, covered an area of about 400 square miles of territory in sufficient numbers to materially injure the grasses growing on the ranges of the entire region—and amongst these grasses, the species of *Bouteloua*, or Gramma grasses, and the Buffalo grass, *Buchloe dactyloides*, seemed to be the most attacked, grains and other cultivated plants not appearing to be especially attractive to it. In fact very little or no injury was done by it to the cultivated crops growing within the region infested. About the same time that I was investigating this insect upon its northern line of injury, Profs. Snow and Popenoe were studying the same insect upon the southern border of its range, and they found practically the same food-habits there that I had noted in the north, and, by enquiry, found that the insects had come into that country from the south last fall, and had laid their eggs over a large area. This year when the eggs hatched, the young began to move from their breeding centres in all directions, seeking open places and the edges of ploughed fields, and following roadways. This trait of seeking open spots this season is probably due to the habit of the insect of naturally living on open ground where grasses are short and scattered. The present year was very wet in this particular region and caused an undergrowth of grasses, hence the desire to find the natural conditions under which the insect lives. The young began moving and finding these open places, there congregated. Having thus gathered together in large numbers, they must feed, and they naturally swept the grasses clean around these spots; so noticeable was this in certain spots where they had gathered about the hills of a species of ant which raises mounds of small gravel and cuts away the vegetation for some distance around them, they had enlarged these areas, in some places for fully half an acre. This year Messrs. Snow and Popenoe observed them flying southward with such ease, by reason of their long wings, that they resembled birds.

Dissosteira obliterata, Thomas. Closely related to the above and very similar in appearance to it, is a second species of these large, long-winged locusts, which was found in injurious numbers along with *Camnula pellucida* in Idaho last year. It was quite common in the Wood River county lying north of Shoshone, and in the vicinity of Boise City, Idaho. One form of this species was described by Saussure as *Dissosteira spurcata* in his "Prodromus *Oedipodorum*". This is not the *Oedipoda obliterata* of Stoll.

Camnula pellucida.—This is the insect which has occasionally been very destructive in parts of California and Nevada. It has since spread eastward into Idaho, where it is very destructive the present season, covering an area of at least 1,300 square miles of territory. It also appears in great numbers, with several other species, in the Red River Valley of Minnesota, North Dakota and Manitoba. I also observed it abundantly in the Prickly Pear and Gallatin Valleys of Montana, near the mouth of the Yellowstone, in North Dakota, in portions of Wyoming, Colorado and the extreme western parts of Nebraska. It also occurs in the New England States and British America. This is a species which readily adapts itself to any new locality, being the most easily acclimated of any of our injurious locusts. When once established it is there to stay, and will require earnest attention from time to time in the future. In fact, I consider this locust, though not migratory, fully as destructive as the Rocky Mountain or true migratory locust, from the fact that it so soon becomes acclimated.

Acridium americanum.—This large, handsome locust is the species which occasionally devastates Yucatan, Central America and Mexico, and even reaches the United States in injurious numbers along our southern coasts. It has also been known in dangerous numbers as far northward as the Ohio River, and occurs sparingly as far north as the Northern States, but I imagine never reaches British America.

Dendrotettix longipennis.—"Post Oak Locust" of Texas. During the spring of 1887, while visiting Washington County, Texas, to investigate a local outbreak of an injurious locust, I heard of a species that was attacking the oaks of that particular region, and in some places entirely defoliating them. On my way from the region where I had been working, to the city of Brenham, we passed through the infested locality, and I obtained some of the insects in question, which were then in the larval stage. A careful examination proved the insect to be new and congeneric with a species heretofore collected only in the vicinity of St. Louis, Missouri, which also occurred only on oak. About a year later this species was described by Professor Riley under the above name. The insect occurs in two forms, long-winged and short-winged. The former flies with great ease and often leaves the trees in midday and alights in fields and other clearings—with the least disturbance it rises again and flies to the tops of the adjoining trees. The larvæ and pupæ are also exceedingly active, and run over the branches and trunks of trees with great

rapidity. The eggs are laid in the ground around the bases of the trees. An area of at least fifty square miles of forest was completely defoliated by these insects during that and the previous year.

Melanoplus spretus.—The Rocky Mountain or Migratory Locust. This is the insect which is generally referred to as the destructive locust of North America, and has caused more injury during the past twenty years than any dozen of the other species combined. It is this species which we most fear, on account of its migratory habits—so marked is this trait that swarms hatching on the Saskatchewan have been traced to the Gulf of Mexico in one season. Its habits have been so frequently described that further mention is unnecessary. Suffice it to say that at the present time it is again decidedly on the increase along our northern boundary. During the present year reports of its injury were received from Minnesota, North Dakota and Manitoba, by the Department of Agriculture, and upon investigation I found these reports to be only too true. In Minnesota and Dakota the authorities, ably assisted by the efforts of settlers, have been carrying on a vigorous warfare with marked results, which will doubtless save their crops from devastation next season.

Melanoplus atlantis, Riley. The Lesser Migratory Locust.

This locust, which frequently becomes very injurious on account of its excessive increase, is somewhat smaller than the Rocky Mountain species. It is also migratory in its habits, but to a much less degree than is *spretus*. In its distribution this insect is much more widely spread than the preceding—being a common one in almost all parts of our country from the Mexican boundary to the 53rd degree of north latitude, and even beyond in some parts of the country. It is the species which most frequently does the locust injury in the New England States, much of that in our Northern States, and some of that in the extreme north-west. It has also been known to become injurious even in the Middle and Southern States. In its distribution *atlantis* appears to be more partial to hilly or mountainous country, and especially is this noticeable in reference to its appearance in destructive numbers. It also seems to prefer wooded or mixed country to the open prairie or plains.

As would naturally be expected from its wide distribution, this particular locust presents some variation in its size, colour, and to some extent also, its structure. At any rate, there appear to be three well-marked forms of the species to be met with within the confines of North America.

Melanoplus devastator, Scudd.

A third species of the genus *Melanoplus* is the one that occasionally appears in destructive numbers in portions of California and the adjoining States. It is about the same size as the *atlantis* just mentioned, and often does considerable injury to the crops of the regions where it occurs. Although this locust is known to inhabit almost the entire region lying to the west of the main divide of the Rocky Mountains, and to reach even beyond in Montana and Colorado, it has never, to my knowledge, been injurious except in Nevada, California, Arizona and Oregon. This species also occurs in two forms, viz., small and large, being the spring and fall broods as nearly as I have been able to decide from specimens in collections.

Melanoplus bivittatus, Say. The Two-striped Locust.

This is our common species of "native grasshopper" all over the country, and the one that so frequently becomes injurious to our gardens and about the edges of fields. It occurs from the Atlantic to the Pacific, and from the Gulf of Mexico to the Saskatchewan. Its increase in destructive numbers appears, however, to be confined chiefly to the regions lying between the Rocky Mountains and the Atlantic. This locust also appears to vary considerably in its size and colour. There are, however, two well-defined forms of it, the one receiving the name *bivittatus* and the other going by that of *femoratus*—the latter occurring only northward.

Melanoplus differentialis, Thos. The Differential Locust.

Next to the species just mentioned we frequently find a second species of our large native locusts appearing in destructive numbers. This latter species occurs in the Western and Middle States only, and is here very often known to become unduly numerous and destructive to both field and garden crops. It has been reported at different times to have been present in such numbers in portions of Illinois, Indiana, Missouri, Kansas, Iowa and Nebraska. A melanistic or black form of it is quite frequent in portions of Nebraska and Kansas; but otherwise it is quite permanent in its characters.

Melanoplus ponderosus, Scudd. The Ponderous Locust.

An insect very closely related to the preceding is that known to the entomologist by the above name. It is a native of several of our Southern States, and has on several occasions been the depredator of crops in portions of central Texas. As the name would imply, it is of robust form, and it has a somewhat similar appearance to *differentialis*.

Melanoplus femur-rubrum, DeG. The Red-thighed Locust.

Last on the list of destructive locusts is herewith presented the one that perhaps enjoys the greatest geographical range of all of our species. It is the common one in all parts of the country from the Atlantic to the Pacific and from the Arctic circle to Central America. Its devastations, while perhaps not as vast as some of the preceding, have been more frequent and have occurred at more localities than those of any other one. Like the *bivittatus*, *differentialis* and several of our non-destructive species, *femur-rubrum* is a frequenter of rather low places and rank vegetation.

After giving these brief notes on the various species of locusts that have been known in the past to have been connected with the injuries from this class of insects within the country, it will not come amiss for me to say a few words about the subject for the present season, and to give my opinion as to the probable outlook for the coming year. Briefly, then, let me say that there have been received reports of locust injury from the following States:—Alabama, Mississippi, Texas, New Mexico, Arizona, California, Idaho, Colorado, Kansas, Nebraska, North Dakota, Minnesota, Iowa, Indiana, Ohio, Michigan and New York. In fact, there have been more separate reports received the present year than ever heretofore from this cause.

Now a word or two as to the different species of these destructive locusts that are responsible for the injuries of the present year. In California the *devastator* is present; the *Camnula pellucida* is known to be unduly common in Idaho, Minnesota, North Dakota and parts of the Rocky Mountain region; the Rocky Mountain or Migratory locust is the one that is responsible for most of the injury that has been reported from the Red River Valley of Minnesota and North Dakota as well as in Manitoba to the north of the international boundary; *Melanoplus differentialis* is the one that must receive much of the blame for Kansas and Nebraska injury; while in the States of Indiana and Ohio *femur-rubrum* and *bivittatus* are the guilty parties. *Melanoplus atlanis* is present in injurious numbers in the Red River Valley along with *bivittatus*, *spretus* and the *Camnula pellucida*. In Colorado and New Mexico for the first time *Dissosteira longipennis* has appeared as one of the injurious species of the country.

While all of these locusts, along with nearly every other species of the

group which are native to North America, are to be counted as injurious, the particular one that has been the dread of the whole country, and especially of the region lying between the Mississippi River and the Rocky Mountains, is the Migratory species, *Melanoplus spretus*. This insect is now on the increase in a limited area on our northern boundary and across the line in the province of Manitoba. By continuing the prompt and energetic efforts that are being carried out by the populace and State authorities of the States of Minnesota and North Dakota we can be assured of success only provided the Canadian Government will also see the advantage of co-operation at this time. This, let me state, is all the more necessary at this particular time, as all reports seem to indicate that at present this locust is not present in abnormal numbers in any other part of the country. A stamping out of the pest in this region might, therefore, give immunity from their further injury for many years to come.

Finally, let me urge on the inhabitants of all infested regions that a "stitch in time saves nine." In other words, we do not know what the climatic conditions may be a year hence, whether they will be such as to favour the hoppers or not, so we had best do the wise thing and stamp out the pest. This has been done time and again in the past, and the recent work in the north shows how very profitable is the warfare when carried on persistently. By the plowing under of the eggs laid last fall, and the use of the kerosene pans or hopper-dozers in the destruction of the young locusts that did hatch, the twelve counties in the two States of Minnesota and North Dakota saved by actual computation on wheat alone the neat little sum of \$400,000. This, mind you, in a year not considered a locust year, and not to take into consideration what was saved to the region for other crops and the injury that might have resulted next year had the hoppers not been destroyed. With every favouring circumstance, the comparatively few locusts of this one species that have thus far been destroyed, the present year in this region would have been sufficient to overrun at least calculation the entire area of the State of Minnesota, the two Dakotas and Nebraska, along with portions of Iowa and Kansas. True, these favouring circumstances might never occur, but it is always best to be on the safe side. This we should know from our past experience with this same insect.

"Native" locusts, while perhaps not to be dreaded equally as much as the species just spoken of, certainly can commit an equal amount of injury when size and numbers of the insects are taken into consideration.

They cannot, it is true, get up and fly away to regions new, but they are equally rapid breeders with favouring conditions. They can be destroyed equally as well, if not better than can the Rocky Mountain species, on account of their local restriction even in the regions where found.

MEETINGS OF THE MONTREAL BRANCH OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The 162nd meeting of the branch was held on April 14th, at 74 McTavish Street, Mr. H. H. Lyman, President, in the chair. Owing to some of the members being busy with college examinations the attendance was not so good as usual.

Mr. Lyman read a paper entitled, "Can Insects Survive Freezing?" quoting from several well-known authorities on Entomology in favor of an affirmative answer to this question. A number of very interesting specimens were exhibited by the members. After spending some time in examination of these, and discussion, the meeting adjourned.

The 163rd regular and 18th annual meeting of the branch was held on May 12th, at 74 McTavish Street, Mr. H. H. Lyman, President, in the chair. The attendance of members was good, including the Rev. Mr. Fyles of Quebec.

The annual report of the Council for the past year, and the Treasurer's report were read, and will be published, as usual, in the next report of the Society.

Mr. Hausen read a paper entitled, "Some Little Known Canadian Coleoptera," containing descriptions of two new species, viz., *Zilora canadense* and *Philonthus stictus*. This paper has been published in the Record of Science, Vol. IV., p. 319, with plate.

Rev. Mr. Fyles read a note on *Nematus pallidiventrīs*. A European species of saw-fly lately introduced into this country, with description of larva, pupa and imago. (See CAN. ENT., XXIII., p. 135.)

After spending some time in discussing these papers and examining specimens, the meeting adjourned.

The 164th meeting of the branch, held on June 18th, was principally devoted to "sugaring" for moths on Mt. Royal, but Noctuidæ seemed to be scarce and very few were attracted. The meeting was held later at 74 McTavish Street, Mr. H. H. Lyman, President, in the chair. Mr. Hausen read a note on "The Occurrence of *Platynus rugiceps*, Mann., at Montreal," and after some discussion the meeting adjourned.

A. F. WINN, *Secretary*.

A NEW SPECIES OF CERURA.

BY GEORGE H. HUDSON, STATE NORMAL SCHOOL, PLATTSBURGH, N. Y.

Cerura modesta, n. sp.

Male.—Front and vertex nearly white. Collar a little darker, tinged with a faint creamy yellowish-brown. Thorax dark steel-blue, almost black, with metallic purplish reflections, the orange scales forming so marked a feature in other species either entirely absent or with but a faint trace of their presence. Patagia concolorous with thorax, edged outwardly with white. Abdomen black above, or nearly so, the segments bordered behind with pale cinereous, thickly clothed with long fine white hairs, whitish beneath.

Primaries on outer third nearly concolorous with collar, not white as in *borealis* and *aquilonaris*, whiter towards base; spots and bands an even blackish dull purple, nearly concolorous with thorax. A spot at the base of subcostal and median veins; and just beyond this, a row of four similar spots crossing the wing at nearly right angles to the costa and forming a straight, or almost a straight, line. A wide median band, from 3.7 to 5 mm. on costa, inner edge nearly straight, parallel with the row of four spots, outer edge slightly excavated just above and below median vein, narrowing to from 2.5 to 3.8 mm. and widening again at inner margin to about the same width as on costa, often appearing wider on inner margin from its union with other outer lines. Subterminal band from 3 to 4 mm. wide on costa, outer edge nearly parallel with margin to near the anal angle, narrowing rapidly on the inner edge from vein 5 to vein 3, where it becomes obsolete, appearing again at near anal angle. Between the median and subterminal bands, there are three very fine almost obsolete lines, one within or including the elongated prominent discal spot, the others, beyond this, scalloped, slightly pointed and a little darker on the veins; these lines become more distinct at inner margin, where they often unite with the submedian band. The pattern is much like that of *occidentalis*, and the fine lines are similarly marked by spots on the costa. The two bands are very uniform in colour, are not bordered by darker lines, and show almost an utter absence of the edging of orange scales found in other species. The terminal intervenular spots are very small, as small as in *albicoma*. The vestiture is thin, the scales narrowing more rapidly than in *borealis* and *aquilonaris*, as you pass from base to external margin, giving the outer part of the wing a

thin, semi-transparent appearance, the ends of the scales are more serrate and more closely appressed to the membrane.

Secondaries nearly concolorous with primaries, paler, with a diffuse subterminal band widest opposite the discal spot and expanding again at anal angle. In one specimen there is another narrow band just before the subterminal and subparallel with it, more distinct beneath. Intervener spots connected by a fine dark terminal line of the same colour.

Beneath, paler, discal spots elongated and distinct. On primaries the median and subterminal bands often unite throughout their entire length, covering the entire wing, save only the basal portion, a narrow whitish costal streak, and a narrow and quite uniform whitish band on the outer margin of the wing.

Expanse, 40 to 44 mm.

Described from seven males.

I have taken the species from the electric lights in Plattsburgh, N. Y., in 1887, 1890 and 1891, as follows: May 9-3, 10-4, 12, 13, 15-5, 19, 20, 21-2, 23, 26, 27, June 1, 11, 20. The figure after the date shows the number taken, where the date alone occurs but one specimen was taken. *Occidentalis* has not been taken before May 11th, and *cinerea* and *borealis* not before the 28th.

DESCRIPTION OF A NEW SPECIES OF ARGYNNIS FROM ALBERTA TERRITORY.

BY W. H. EDWARDS, COALBURGH, WEST VA.

Argynnis Victoria.

Male.—Expands two inches. Upper side pale fulvous, primaries a little obscured next base, secondaries largely, the dark area covering nearly the basal half; the black markings rather heavy; a common black marginal border, narrow on primaries, one-third wider on secondaries; a common series of small submarginal spots, sub-oval on primaries, crescent on secondaries, and on neither wing touching the marginal border; the rounded spots largest on primaries; the discal angular band on same wing heavy, on secondaries light; a bar on arc of cell of primaries, another crossing the cell a little within, a rounded elongated spot depending from subcostal, near middle of cell, and a crescent close to the base; in the submedian interspace an angular cross bar; on secondaries a V shaped spot at end of cells.

Under side of primaries faded fulvous, brownish over basal part of cell; small patches of orange-ferruginous in the sub-costal interspaces; the markings repeated, reduced, pale; secondaries orange-ferruginous, deepest next base; a marginal black line, and within and parallel a heavier one; next this on each interspace is a small yellowish patch which crosses the inner line nearly or quite to margin, and on basal side are a few black scales, which, in the two or three posterior interspaces, take crescent shape; the round spots repeated; close above these is a narrow transverse band of connected yellow-white crescents, not well defined, each with scattered black scales at top; across the disk a broad angular band of yellow-white, edged on both sides rather heavily by black; this may be considered as a chain of spots, as the separating nervules are black, and the one in the cell is prolonged nearly to the yellow band, and cut almost in two by the black edging of the arc of cell; the deep orange space beyond this discovers no spot except a small whitish triangle in cell, which is without black edging; at the base whitish patches at the origin of the interspaces and cell, sprinkled with black, the posterior ones edged black without. The mesial band has something of a margaritaceous sheen, but it is very slight and dull. Body red-brown above, beneath the abdomen is grey-yellow; legs red; palpi have long red frontal hairs, among which are a few black; antennæ fuscous above, red below; club black, tip ferruginous.

The female I have not seen, but Mr. Bean tells me that is essentially like the male.

Described from a single male taken with others of both sexes by Mr. Thos. E. Bean, at Laggan, Alberta. He says: "It is strictly alpine, and the rarest butterfly regularly found here. It flies in a part of the district which *Alberta* frequents, but at the highest parts of that district almost altogether, and it differs entirely in its habits from *Alberta*. The sexes are alike, but the female is moderately larger than the male. It is the most difficult butterfly I have found to capture. The last week in July seems to be the time of flight." There is no other American species with which to compare *Victoria*. It is as large as the Laggan *Eurynome*, but has the peculiar mesial band (under hind wing) of the *Chariclea* group, though with a difference, both edges being more regular, and the colour white. That two new species of *Argynnis* should have been discovered by the indefatigable naturalist at Laggan is noteworthy. Doubtless many more remain to reward the labours of other zealous workers in the vast unexplored regions of British America.

SMERINTHUS OPHTHALMICUS, BD.

In the July number of CAN. ENT., page 143, Prof. French described the larval stages of this species but did not observe the egg and first stage. These I can supply, as follows:—

Egg.—Elliptical, flattened above and below, smooth, slightly shiny; colour probably green. Under the microscope it is seen to be covered with crowded minute shallow depressions. Dimensions, $2.0 \times 1.8 \times 1.3$ mm. Laid singly on under surface of leaf.

First Larval Stage.—Head rounded, slightly bilobed, not pointed as in the next stage, green, slightly shiny, and dotted with yellow, but not granulated, with a curved yellow line from before the eyes on each side, meeting each other below the vertex. Antennæ and labrum white; jaws and ocelli black. Width, 1 mm. Body annulated, minutely pilose and dotted with yellow, with a distinct pale yellow subdorsal line and oblique lateral lines on joints 5–12, occurring above and below the subdorsal line, but dislocated, except on joint 12 where a single distinct line runs to the base of the horn. Horn minutely pilose, dark red, pale at base, 2 mm long.

The second stage is as described by Prof. French; width of head, 1.5 mm.

Food Plant.—Poplar (*Populus*). Larvæ from Mariposa County, California.

HARRISON G. DYAR.

CORRESPONDENCE

MELITÆA PHAETON.

Sir,—While spending a few days in Ottawa, during July of last year, I was fortunate enough to find a batch of the larvæ of *Melitæa phaeton*, which composed a large colony in their tent-like web upon the tip of a robust stem of *Chelone glabra*, which is their favorite food plant in that district. I was anxious to breed the species, so boxed the whole colony and brought it back with me to Port Hope. Here, however, I could not find any plants of *Chelone glabra*. Upon turning up Scudder's "New England Butterflies," I found that honeysuckle, *Lonicera*, was given as a food plant. I first offered the larvæ leaves of trumpet honeysuckle, obtained from a neighbour; but, as this was not convenient, I resolved to try them on Tartarian honeysuckle, of which an abundance grew in the

garden. They took to it with comparative readiness, and much to my delight I succeeded in bringing a goodly number through the winter. I hibernated them in an area window below the surface of the ground, but without any special care. Towards the end of April, as soon as the young leaves began to unfold, I took them out of winter quarters and fed them again on the Tartarian honeysuckle. The first specimens began to pupate about the end of June, and in July I had the pleasure of seeing the perfect butterflies.

A. M. BETHUNE.

Port Hope, August 28, 1891.

HALISIDOTA TRIGONA.

Sir,—When describing this species in Kansas Transactions I gave the differences which I observed between Herrich-Schæffer's figure of the Brazilian species, *specularis*, and my material. Mr. Dyar's note was therefore not warranted and, had he seen the Kansas Transactions, he probably would not have published it. In reply to Mr. Smith's note, I would state, that I have not seen the British Museum material. I do not know whether this is correctly determined, but I should rely on Mr. Butler's comparisons, as he most certainly knows Herrich-Schæffer's work. The type of *specularis* came, I presume, from Boisduval, and will in this case be accessible to study. The matter will probably be settled by the bringing together of fresh material from the south-west and by breeding the North American species. In the meantime *trigona* must stand as the first description of a North American species belonging to the *specularis* group, which seems to belong, more particularly, to South America.

A. R. GROTE.

LIMENITIS LORQUINI.

Sir,—Please correct my statement, p. 174, that "the second brood of larvæ (of *L. lorquini*) probably hibernate in the second stage," etc., to the following:—"Part of the first brood, and the entire second brood, pass the winter in the second larval stage in hibernacula formed of the basal part of a leaf spun together at the top."

H. G. DYAR, Yosemite, Cal.

AGROTIS SUBGOTHICA.

Sir,—In reply to Mr. Tutt's note in the July number of the CAN. ENT., p. 159, I would state that I have no knowledge of Haworth's work in which *subgothica* is described. I have everywhere taken Stephens's identifications of Haworth's species. Now Stephens figures *jaculifera* of Guenée, as figured in the Species Général, typical *jaculifera*, as *subgothica*, of Haworth (?). If, then, Stephens is wrong, and Haworth's *subgothica* is a variety of *tritici* and not our American species, this latter must be known as *jaculifera*, and Prof. Lintner's name of *tricolor* must then clearly be retained for that species, as insisted upon by myself. Stephens's figure is unmistakably based on our American species; how nearly the European *tritici* resembles this I cannot, at the moment, say. The following will be the synonymy of *Agrotis jaculifera*. According to Mr. Tutt's statement that *subgothica* of Haworth is a variety of *tritici* of Linné, our American species must be listed as follows:—

jaculifera, Guen., fig.

subgothica, Steph., fig. in err.

tricolor, Lintner.

jaculifera, Guen. var. A.

jaculifera, Smith, in err.

herilis, Grote.

jaculifera, Guen. var. B.

herilis, Smith.

A. R. GROTE.

SOME CORRECTIONS.

Sir,—In my paper, CAN. ENT., page 152, I say I have placed *Agrotis costata* and its near ally *A. idahoensis* "together wrongly," line 10. It is clear from the context that I meant in a wrong position in my lists. The two species are closely allied, differing in colour, *costata* being reddish, *idahoensis* purplish, and, in *costata*, the pallid costal region is whiter and broader. The two belong together. I have always associated them, and, indeed, described the one comparatively with the other. The types are in British Museum. On page 148, line 6 from bottom, for grouping, read association. On page 151, for "The Practical Entomologist," read the practical entomologists. I was writing, not of a publication, but of a class of working entomologists, whose figures (mostly duplications of the same cut) confounded the three forms: *subgothica*, Stephens (= *jaculifera*, Guen.), *tricolor*, Lintner (= *jaculifera*, Smith), and *herilis*, Grote (= *herilis*, Smith).

A. R. GROTE.

Mailed September 21st, 1891.

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No. 10.

DESCRIPTIONS OF SOME BUTTERFLY LARVÆ FROM YOSEMITE.—III.

BY HARRISON G. DYAR, YOSEMITE, CAL.

Phyciodes mylitta, Edw.

Egg.—Not observed ; but laid about 50 together.

First Stage.—Head shining black ; width .25 mm. Body cylindrical ; cervical shield and anal plate black ; fine black hairs, slightly curving forward, arise from minute black elevated spots.

Second Stage.—Head black and shiny ; width, .40 mm. The body is covered with rows of conical elongated tubercles, each with many bristly hairs, arranged as in the mature larva. Sordid greenish, shaded with black dorsally, the cervical shield, anal plate and tubercles black.

Third Stage.—Head slightly bilobed with a few hairs ; shining black, labrum pale ; width .60 mm. Cervical shield and anal plate black, the processes on the body densely spined, not long, the three upper rows on each side black, the rest short and pale. Body blackish on the dorsal half, with a black dorsal line ; subventral and ventral regions pale whitish. Thoracic feet black, abdominal feet blackish.

Fourth Stage.—Head slightly bilobed, rounded, ocelli large, mouth projecting ; a number of hairs, colour shining black, labrum whitish, hair black ; width 1.1 mm. Body covered with conical processes, .50 mm. long, densely spined and arranged as in *Junonia*. The body dorsally, including the cervical shield and anal plate and the three upper rows of processes, deep black ; grayish laterally and subventrally, the fourth row of spines and a stigmatal band running along their bases subtranslucent white. Thoracic feet and last pair of abdominal feet black, the others much paler ; claspers white.

Fifth Stage.—Head black and shiny, slightly hairy, a whitish streak on the side of the vertex of each lobe ; width 1.8 mm. Body black

above, yellowish subventrally, with a faint geminate yellowish dorsal line. The conical spined tubercles of rows (1)–(3) are black, rows (4)–(6) straw-yellow, spiracles black; thoracic feet black, abdominal pale. As the stage advances subdorsal, stigmatal and substigmatal lines appear, not very distinct, and formed of yellowish mottlings on the black ground colour.

Chrysalis.—Of usual shape, thorax not carinated but with three blunt points, the anterior part rounded; cases moderately prominent; a depression between thorax and abdomen. Abdomen straight along the ventral side, curved dorsally, with five rows of short, blunt points, cremaster flattened, rather long, colour nearly uniform, dull wood-brown from black mottlings on a reddish-brown ground colour, the dorsal tubercles reddish. A row of minute white dots on antennæ cases and around borders of wing. Length, 12 mm.; width, 4 mm.

Food Plant.—Thistle (*Carduus*).

Chrysophanus arota, Boisd.

Larva.—Elongate elliptical, flat below, the feet all short; sides sloping; dorsum forming a narrow flattened ridge, slightly wider on joints 3 and 4; body highest at joint 5 and tapering to the extremities. Head retracted under joint 2, pale testaceous, the mouth parts surrounded with brown; width in the last stage, 1 mm. Body minutely pilose, with very small white granulations, or subdorsal white line along the ridge interrupted at the segmental sutures (which are deep), beginning on joint 3, most distinct on joints 3 and 4, somewhat fainter centrally, and somewhat more continuous posteriorly. A similar fainter line on the subventral ridge, becoming obsolete at the extremities. Both lines look as if not quite on the surface. Spiracles small, circular, yellowish. Cervical shield in the middle of joint 2, very small, triangular, depressed. Length, 17 mm.; width, 5 mm.

Chrysalis.—Robust, short, rounded; depression between the thorax and abdomen small; abdominal segments appressed, motionless. General colour sordid green, most distinct on the abdomen dorsally; thorax with a few black specks and a smoky black dorsal line which is continued in a row of dots on the abdomen. Each side of this, on the central part of the thorax, is a white streak, supplemented on the posterior part by a short white curved line. On the abdomen, a subdorsal row of blackish

spots and a number of smaller black dots, besides an obscure white line on the posterior part, each side of the dorsal row of dots; abdomen pinkish laterally. Length, 12 mm.; width, 5.5 mm.

Food Plant.—Wild gooseberry (*Ribes*). The larvæ occur several on the same branch, but they feed singly.

THE LARVA OF ZOTHECA TRANQUILLA, GROTE.

BY HARRISON G. DYAR, YOSEMITE, CAL.

Eggs.—Laid in a mass, probably under the bark of the food-plant, for which purpose the long ovipositor of the ♀ moth seems fitted; the winter is probably passed in this state. Spherical, but somewhat misshapen from being closely pressed together; smooth, slightly shiny, under the microscope appearing irregularly indented; colour, yellow, becoming later reddish; diameter, .5 mm.

There appear to be six larval stages, the last two of which are all that came under observation, and to them the following description applies: The larvæ live singly, each in a leaf of its food-plant, curled over and lined with silk.

Larva.—Head entirely black, except the bases of the antennae, which are whitish; smooth, shiny, but under a lens seen to be slightly shagreened; a few hairs. Width in the fifth stage, 1.8 mm.; in the sixth, 2.8 mm.

Body plump and smooth, tapering at the extremities, curled spirally when at rest. The small black piliferous dots are normal in arrangement; row (4) stigmatal, posterior to the spiracles; rows (5) and (6) anteriorly and posteriorly in the subventral space, and row (7) the dots on the venter of the apodal segments are very small. Dorsum dark olive-gray, containing a broad yellow dorsal band, which is broken into two round spots on each segment, the anterior one of which is twice indented, or nearly bisected on the dorsal line. This marking is narrower towards the extremities and becomes somewhat confused. Below the olive-gray is a narrow interrupted whitish subdorsal band bordered with black, a lateral blue-gray band and a broad yellow stigmatal band separated from the lateral band by a wavy black line. Venter bluish gray, streaked with black subventrally, feet yellowish, spiracles black. In another example the dorsal and lateral regions are concolorous, bluish gray, sprinkled with black streaks, the dorsal and subdorsal bands edged with black. The anal plate is unornamented.

Cocoon.—Formed of silk, quite thick and not at the ground.

Pupa.—Cylindrical, the abdominal segments tapering, cases and thorax moderately enlarged, cremaster tapering, flat, armed with short hooks. Smooth, pitchy dark brown, almost black, paler in the three movable abdominal incisures. Length 17.5 mm., width 5.5 mm.

Food plant.—Elder (*Sambucus*).

There is but one brood a year,* the moths appearing during the last of June.

The appropriate and pleasing name of this pretty species was kindly sent me by Prof. Smith.

A TACHINID BRED FROM A CHRYSALIS.

BY C. H. TYLER TOWNSEND, LAS CRUCES, NEW MEXICO.

Meigenia websteri, n. sp.

FEMALE.—*Head* a little wider than thorax and abdomen. *Eyes* brown, very sparsely hairy; front and face not quite one-half the width of head; front a little prominent; frontal vitta about one-fourth the width of front, brown, lighter behind where it splits on each side of the ocelli; frontal bristles in a single row, descending a little below base of third antennal joint, some fine hairs on sides of front outside them; two orbital bristles; sides of front with a slightly brassy tinge; sides of face moderately wide, a little less than one-half the width of the facial depression, silvery, bare; face slightly receding, facial depression silvery, facial ridges ciliate to a little below base of third antennal joint; cheeks moderately wide, cinereous, hairy, with bristles on lower border; vibrissæ inserted at a little distance above the oral margin; antennæ not as long as the face, blackish, third joint slightly reddish at base; second joint not elongate, bristly; third joint not widened, more than three times as long as the second; arista black, microscopically pubescent, thickened more than half its length, three-jointed, the second joint hardly elongate; proboscis, brown, fleshy, not so long as height of head, labella well developed; palpi well developed, flavous, club-shaped, thickened and curved at the tip, black bristly; occiput cinereous, gray hairy below, with fringe of black hairs on orbital margins.

Thorax clothed with stout bristles and very fine short hairs, cinereous, with four narrow blackish vittæ; scutellum, broadly light-reddish ochreous at tip, with two stout lateral macrochætæ, the posterior one reaching the base of third abdominal segment, also a discal pair, and a short, decussate apical pair. *Abdomen* rather broadly ovate, first segment black, somewhat abbreviated; other segments cinereous, with a narrow blackish hind margin; first segment without macrochætæ; second with a lateral marginal one and a median marginal pair; third segment with about ten marginal macrochætæ above, and others below; anal segment armed with marginal and sub-discal macrochætæ. *Legs* black, bristly, femora somewhat silvery; tibiæ with stout bristles, especially hind pair which are also ciliate on outer edge, a longer bristle in middle and another at tip; claws and pulvilli slightly elongate. *Wings* longer than abdomen, without costal spine, grayish-hyaline, third vein spined at base; apical cell ending a little before tip of wing, narrowly open; fourth vein rounded at bend, without stump or wrinkle; apical cross-vein nearly straight; hind cross-vein sinuate, nearer to bend of fourth vein; tegulæ whitish, halteres fuscous.

MALE.—Differs as follows:—Smaller; front hardly more than one-third width of head; face not so broad; no orbital bristles; antennæ nearly as long as face; third joint about five times as long as the short second; claws and pulvilli not elongate.

Length 6 to 7 mm.; of wing 5 to 6 mm.

Described from two specimens, ♂ ♀, from Professor F. M. Webster, and bred by him from a chrysalis. Lafayette, Indiana.

NOTES ON THE DYSDERIDÆ OF THE UNITED STATES.

BY NATHAN BANKS, ITHACA, N. Y.

The *Dysderidæ* is a small family of spiders occupying in a certain respect an intermediate position between the *Tetragnemones* and the *Dipneumones*; the openings to the tracheæ are just behind the lung-slits, so that they may appear to have four lungs. The eyes are six in all of our forms. The mandibles are not small, in *Dysdera* quite large. The

male palpi are quite simple in structure. Our genera may be separated by the following table :

1	M. E. *in front of A. S. E.....	<i>Usofila</i>
	M. E. not as far front as A., S. E.....	2
2	M. E. in front of P. S. E.....	<i>Segestria</i>
	M. E. as far back as P. S. E.....	3
3	Three claws to tarsus.....	<i>Ariadne</i>
	Two claws to tarsus.....	<i>Dysdera</i>

USOFILA GRACILIS, Keys.

Marx in Proc. Ent. Soc., Wash., 1890, Vol., II., p. 36, pl. I., fig. 6.
Alabaster Cave, Cala.

This is quite unlike other *Dysderidæ* in general appearance, but is referred by Keyserling to this family.

DYSDERA INTERRITA, Hentz.

D. crocata, Koch. Marx Cat. Aranæ of temp. of N. Am., 1890.

D. interrita, Hentz. Proc. Bost. Soc. Nat. Hist., Vol. IV., p. 224, 1842.

“ “ “ Spid. U. S., ed. Burgess, p. 20, pl. II., fig. I., 1875.

“ “ “ Emerton, New Engl., Drass., Agal. and Dysd.,
p. 36, pl. VIII., fig. 2, 1890.

New Engl., N. Y., D. C., Md., Va.

ARIADNE BICOLOR, Hentz.

Pylarus bicolor, Hentz. Proc. Bost. Soc. Nat. Hist., Vol. IV., p. 225,
1842.

“ “ “ Spid. U. S., ed. Burgess, p. 21, pl. II., fig.
3, 1875.

“ *pumilis*, Hentz. Proc. Bost. Soc. Nat. Hist., Vol. IV., p.
226, 1842.

“ “ “ Spid. U. S., ed., Burgess, p. 22, pl. II.,
fig. 5, 1875.

*M.E.—median eyes; A.S.E.—anterior side eyes; P.S.E.—posterior side eyes.

Ariadne bicolor, Hentz. Emerton, New Eng., Drass., Agal. and
Dysd., p. 37, pl. VIII., fig. 3, 1890.

“ “ “ Marx Cat. Aranæ of temp. N. Am., 1890.

“ *pumilis*, “ “ “ “ “ “ “ “ “ 1890.

New Engl., N. Y., D. C., La., Ala., Fla., Ohio., Va., Md., Pa., N. C.

A. pumilis is only the young of *A. bicolor*.

SEGESTRIA PACIFICA, nov. sp.

Length, 5.3 mm. ; length of ceph., 2.3 mm. ; length of abd., 3. mm.

Breadth of ceph., 1.3 mm. ; breadth of abd., 1.5 mm.

Length of femur I., 2. mm. ; Length of tibia I., 1.8 mm.

Color—Cephalothorax brown, darkest near front margin, yellowish towards posterior end ; mandibles, reddish brown ; maxillæ, yellowish ; lip and sternum, brownish ; palpi whitish, with dark ring at base of tibiæ ; legs whitish, with brown rings at tip of femora, on patellæ, and near base and tip of tibiæ and metatarsi, first pair darkest ; abdomen nearly white, with scattered reddish-brown spots, which form a large patch on the middle of the dorsum and a few smaller patches behind it ; on the venter a broad median stripe reaches from the lung-slits to and around the spinnerets, which are yellowish.

Cephalothorax wide in front, but little wider in middle, rounded behind, head low, eyes six, S. E. touching, the A. S. E. not quite their diameter from the front margin, M. E. larger than S. E., touching, about their diameter from the front margin. Mandibles large, slanting, much thicker than anterior femora ; maxillæ long ; lip long and truncate at lip ; sternum narrow in front, widest behind the middle ; legs 1-4-3, 2nd pair lost ; first pair of legs largest ; abdomen nearly cylindrical, spinnerets short.

One specimen from Washington State [T. Kincaid].

OFFICIAL MINUTES OF THE MEETING OF THE ENTOMOLOGICAL CLUB OF THE A. A. A. S., 1891.

(HELD IN THE COLUMBIAN UNIVERSITY, WASHINGTON, D. C.,

AUGUST 19-22, 1891.)

The Washington meeting of the Club was one of the most successful ever held in point of attendance and interest. Seven sessions were held, with average attendance of twenty-two, and minimum of eighteen. Forty-two persons registered and received Club badges, in the following order :—

Herbert Osborn, Iowa ; John B. Smith, New Jersey ; Howard Evarts Weed, Mississippi ; D. S. Kellicott, F. M. Webster, Ohio ; C. V. Riley, L. O. Howard, Washington, D.C. ; James Fletcher, Ottawa, Canada ; W. B. Alwood, Virginia ; B. Pickman Mann, E. A. Schwarz, Washington, D. C. ; Lawrence Bruner, Nebraska ; A. J. Cook, Michigan ; Paul Wallace, California ; E. B. Southwick, New York ; G. H. Perkins, Vermont ; Geo. H. Hudson, New York ; Wm. H. Ashmead, Florida ; J. A. Linntner, New York ; Howard H. Hopkins, Maryland ; Martha E. Stuart, Nebraska ; Lucien M. Underwood, Indiana ; O. F. Cook, New York ; Mary E. Murtfeldt, Augusta Murtfeldt, Missouri ; E. W. Claypole, Katherine B. Claypole, Agnes M. Claypole, Edith J. Claypole, Ohio ; E. W. Doran, Maryland ; Geo F. Atkinson, Alabama ; J. M. Stedman, North Carolina ; Otto Heidemann, William H. Fox, Geo. Marx, Washington, D. C. ; Charles Robertson, Illinois ; L. H. Pammel, Iowa ; E. A. Popenoe, Kansas ; A. B. Cordley, George C. Schaeffer, C. L. Marlatt, F. H. Chittenden, Washington, D. C.

There was no lack of papers, and the daily programmes of the Club were published in the programmes of A. A. A. S.

MINUTES.

The Entomological Club of the A. A. A. S. met at 9 a.m. on August 19th, at Room 15 Columbian University, President Osborn in the chair ; eighteen members present.

In the absence of the Secretary, the President called Mr. J. B. Smith to act as such during the reading of the address, and Vice-President Miss Mary Murtfeldt occupied the chair during the delivery of the

ANNUAL ADDRESS OF THE PRESIDENT.

BY HERBERT OSBORN, AMES, IOWA.

The Entomological Club has reason to congratulate itself upon the favourable conditions under which it meets. We are here in our national capital, a city in which every American feels a pride, and the beauty of which can but favour our enjoyment. We are in the centre of entomological activity for the United States—and I am tempted to say for the world, for I believe we should have to make diligent search to find any community where so many skillful entomologists are devoting their entire time to entomological problems.

We have here one of the finest insect collections in the country, a collection unique and invaluable in the richness of its biological material, and one which has already become of great use and a Mecca to entomologists all over the country. With all these favouring circumstances we can most certainly expect a profitable meeting, and I feel perfectly safe in saying that every entomologist here will return to the regular duties of his profession with renewed zeal, and with a better knowledge of the possibilities of entomological work, and a feeling that he has been many times repaid for the time and trouble he has expended in attending the meeting.

But with the knowledge of these favouring conditions and the thought of what should be expected in a presidential address on such an occasion, I confess that it is with great trepidation that I undertake the discussion of any of the many problems that are presented as living topics in the entomological field.

Our Club includes in its membership a majority of the working entomologists of America, each one alive to the advancement of his favourite science, eagerly watching for progress in every avenue of research and keenly anxious to favour every means of promoting its interest.

Each one then, we feel, has a special interest in the enlargement of the entomological fraternity, and in the means and methods for the training of the coming generation of workers.

I feel, therefore, that while there are many important topics that could be selected as the basis of this address, I cannot possibly go astray in occupying your attention for a short time with some thoughts concerning the educational value of entomology, the training to be desired in it, and the present and possible means for the growth of this work.

It is but a short time since entomology was entirely excluded from college courses, or, if included at all, formed but a fractional part of zoölogy; and the training given had little reference to the actual work devolving upon an entomological student in the collection and study of his particular favourites.

Even at the present time, there are, so far as I know, not more than a dozen colleges in the country where entomology is given a place in the regular college curriculum, and in only about half of these does it form a required part of any regular college course. In some of these the required work consists of but a short course, devoted largely to economic subjects, and the student gets but a bare insight into the problems of systematic entomology, or the wonderful biological wealth belonging to this branch of science.

To the members of this Club it is of course unnecessary to urge the value of entomology as an educator, but I would like to call attention to it here for the purpose of emphasizing the matter and urging a greater utilization of it in educational work. While we ourselves may realize its value and give it all the rank proper, I fear we do not always insist as we might on the standing it deserves in this regard.

We do not need to depreciate the value of other scientific studies in order to uphold entomological work as one of the most suitable of all branches of science to form a part of a course in scientific training.

That it requires close application, careful attention to details, and thus exercises in fullest degree every faculty of observation, is a necessary consequence of the minuteness and complex organization of insects. It presents, therefore, every advantage offered by botany or any branch of zoology as a means of training the faculties to close observation.

It is stated of Cuvier, that being applied to by a young man who desired to become a naturalist, for advice as to the course he should pursue, he answered, "Go and study entomology."

We believe fully in the necessity of a thorough foundation for entomological as well as any other scientific work, and would by all means advise students intending to enter this field to learn so much of chemistry, physics and general biology as to equip themselves for handling the intricate problems of life which must of necessity be met in any thorough study of insects. But, we would like to urge also the advantage to be gained by devotees of other branches of science if they would use the subject of entomology as a part of their mental equipment. Not only is the training to be gained one that is of the highest value in the cultivation of the faculties we have mentioned, but the facts acquired are of a nature to be used in every calling in life in which the student may engage.

We are all often amused by the questions propounded to us about insects, questions often from highly educated people, which display the direst ignorance concerning some of the most elementary principles of entomology. This condition is one of the greatest hindrances to the adoption of remedies based on any biological foundation. Confusion of species, lack of any idea of the metamorphosis of insects (except possibly some of the most common), and total ignorance of the structure of insects or of the physiological features which enter so largely into the use of remedies, all combine to render the intelligent adoption of the necessary measures in insect warfare difficult.

Education in these matters must be in considerable part by personal means. Teachers in higher institutions must train the teachers who carry knowledge to the academies and high schools, and these in turn must furnish the training in the lower grade and country schools. Will the time ever come when the country teacher will be qualified to answer common questions about insects that may be propounded by his pupils, to give them accurate instruction concerning the most essential principles of the science, or to direct them in the proper methods by which they can get facts by their own observation.

There is no question as to the fascination of the subject, each one here by his presence attests this fact, as attractiveness of the study is the main motive for its pursuit, and the wonder is that so few carry an interest in the subject beyond the enthusiastic collecting of youthful years.

It is true that entomological study soon becomes serious work, when undertaken with any purpose or effort to further knowledge along any of

its lines ; but such work is very pleasurable, and unless in the complexity of the subject or the disheartening number of forms or amount of literature necessary, would seem to present no insuperable difficulties not to be met with in other sciences.

It is perhaps almost unfortunate that there has been a fashion for a few years past to discredit the value of systematic work, and to laud the researches in histology and embryology as the only work deserving the name of science. The tone of contempt that has sometimes greeted the faithful worker in systematic entomology must have had the effect of discouraging some who might otherwise have made valuable contributions to the science.

We should not be narrow, but let our sympathies and appreciation be as extensive as the group in which we are interested ; our perceptions of the earnest effort and the good in others as sensitive as the organizations which we place under our microscopes ; and our encouragement as quick as the movements of our tiny friends.

The work in histology and embryology is essential, and its importance cannot be ignored. Often giving us the only rational method of discovering affinities, it must be resorted to by the systematic student, and none need underrate it. The further study of entire life-histories of insects, one of the most fascinating of all branches of study, presents a field of such great importance to the economic entomologist, so rich in discovery as to modes of life, and so often important in revealing the affinities of related groups, that he who would neglect or deride this part of entomology must have little conception of its range.

But systematic work too has its place and importance, and I trust the time is now coming when there will be a return of workers to this field.

The need of collections and libraries for this work is appreciated by all, and has been well discussed in the address of last year.

I would like to suggest, however, in this connection the importance of the preservation of collections that have been the basis of systematic work by a specialist. Often such collections go to ruin, and the question comes again and again, would it not have been better if such collection had been placed in some established museum, where its preservation would be assured. I believe fully in the formation of working collections, particularly in limited groups, but when it is possible to deposit such a collection

in a place of permanent preservation, I feel that it should be done for the benefit of future students and the advancement of science.

At present the student of systematic entomology must perforce select some limited group, the literature of which he can obtain, and faithfully divorce himself from the pursuit of knowledge in other groups.

This is well and proper for the worker who has gone far enough to become enamored with his specialty and to recognize the limitations necessary, but there are many young students enthusiastic and active whose ardour would carry them through bravely, if but they could pass through the doubtful stage which comes with the conviction that there are many insects which cannot be determined.

Failure to name his collection, or a disheartening search through all the books at his command without getting any clue to the affinities of his specimens, dampens his ardour and quenches his zeal.

The necessary training for the more serious entomological work and that which must in large part be given by means of carefully arranged courses of study, should, I believe, embrace methods in systematic entomology—of studying the complex life-histories of insects, and of working out the problems of minute anatomy and embryology that so constantly confront us. A thorough knowledge of insect anatomy is essential and should be acquired before the student attempts original work on morphology or revisional work in classification. Above all, the student should become impressed with the importance of accuracy, both in study and in statement, and it should be the crowning glory of this as well as all scientific work to develop in the student the keenest perception of the fact that scientific work means truthful work.

The equipment to carry on such instruction is not essentially expensive, and the cost of equipment should not deter any well-endowed institution from providing thoroughly for good work. The item of books will figure largely, but these may be selected as needed and no immense outlay is required at once.

One of the most difficult problems met by the teacher is to supply satisfactory guides to his students in classificatory work, and I believe every working entomologist will concede the desirability of a condensed manual for the determination of the families and genera of the insects constantly met in his work. The question is, how can such a manual

ever be prepared? The work is evidently too great for any one individual, for keys in any group to be serviceable must be prepared by someone familiar with the group; and, furthermore, the entomological workers of America are all too much engaged in active professional studies to devote much time to such work.

That some combined plan is requisite seems apparent, and I know no better place to inaugurate such an effort than in this Club.

There are already many valuable analytical tables, but these are scattered through so many publications (many of which are inaccessible to general students) that to be of service in the particular manner I have in mind, they should be brought together in some compact single volume, with such directions as to their use, as to make them serviceable without a specialist at hand.

I would suggest that a special committee be appointed at this meeting to consider the possibility of preparing such a work, either as a special effort of the club or by simple co-operation among members of the club, who are willing to assist by allowing the use of tables already prepared, or the preparation of new ones in the group with which they are familiar.

Such a manual would necessarily have certain limitations, and, doubtless, at first, some imperfections, but the scope of the work may probably better be discussed in a special committee, should it please you to form one, and the matter of imperfection is incident to every new undertaking.

The cordial reception which this suggestion has met with from some entomologists to whom I have presented it, and their generous offer to allow the use of tables they have published, and to revise and extend them, have encouraged me in the belief that such a plan can be worked out. The matter seems to me of such vital importance, especially in college work and for students who desire to make entomology a serious work, that I believe we should not be discouraged by the difficulties which certainly exist in such an undertaking.

Another matter to which I desire to call your attention is that of a general gathering of entomologists during the Columbian Exposition. We are all aware of the pleasure of meeting our national co-labourers in this field, and if arrangements are made so that a general congress of the entomologists of the world can be had, I believe the interest and profit of the occasion will be great.

In the establishment of the World's Congress Auxiliary of the Columbian Exposition, I understand that such a gathering is contemplated, and that such a general meeting will be provided for, if but the entomological societies and individual entomologists will co-operate in the movement. The time indicated in their circulars seems hardly propitious, as it would seem far easier to secure such a gathering at the time of the meeting of our Association of Economic Entomologists, but, doubtless, the preference of that Association and this Club will be considered, as without their support such a congress could not succeed.

It would seem to me very proper that the club pass a resolution endorsing the effort to arrange for an Entomological Congress, offering its support and designating the officers for the coming year, as the medium of communication concerning any matters requiring action before our next annual gathering, and, if deemed wise, some special instruction as to an effort to arrange dates which will accommodate the entomologists of the country best.

As entomologists we should uphold the standing of our profession. We are sometimes met by evidences of a sentiment hardly complimentary to our calling, an apparent feeling that the entomologist may be a harmless sort of fellow, who catches bugs in a net and then puts them in a bottle ; but that for any important work in this life he does not amount to much. This feeling, I am glad to say, seems to be changing rapidly, and in this connection I feel impelled to remark that in my opinion entomologists owe a debt of lasting gratitude to the distinguished head of the division of entomology for the status given to entomological work in the U. S. and throughout the world. To him, I believe, more than to any other one man is due the credit of placing entomological science alongside of other branches of science in the respect and confidence of the people, and thus bringing our profession from the position of a harmless pastime to one of recognized standing alongside of other branches of applied sciences.

Let us, as entomologists, in all our work endeavor to keep this standard high, to avoid anything like the quackery which drags itself alongside of scientific medication.

* * * * *

Mr. Mann moved a vote of thanks to the President for his excellent address, which duly carried.

On motion of Mr. Mann it was resolved that a committee of three be appointed to consider the recommendations of the address, and report as early as convenient.

Messrs. Mann, Fletcher and Smith were appointed as such committee by the President.

The President suggested a committee on Programme, and on motion of Mr. Mann, amended by Mr. Fletcher, that the Secretary be one of the members, it was so resolved.

Messrs. Webster and Kellicott were appointed the additional members of the committee.

On motion, Mr. Smith was elected acting Secretary for the present meeting.

Mr. Webster moved that one meeting of the Club be set aside for short notes and random observations, and Dr. Kellicott amended by suggesting that the next meeting be so set aside. Both motion and amendment carried.

On motion of Mr. Mann, after some general discussion as to hours of meeting, the Club adjourned to 1 p. m.

AFTERNOON MEETING.

The Club met pursuant to adjournment at 1 p.m., President Osborn in the chair, twenty-one members present.

The President stated that under the resolution adopted, short notes were in order, and he called on the members for such.

Mr. Kellicott mentioned a Tortricid feeding on *Silphium perfoliatum*, whose habits he studied last year, but of which he got only a single imago in bad condition and not yet named. The eggs are laid in the flower buds, and the larvæ eat into and destroy them. At this time the larvæ are livid in colour, and there become about half an inch in length; then they either crawl down outside, or bore through the stem to the root in which they feed until winter. They make a silken tube in which they hibernate and sometimes also pupate; usually in spring they crawl out into the loose soil and there pupate.

Mr. Webster spoke of a Cecidomyid larva preying on the cherry aphid, and exhibited specimens. The imago which was bred seems a *Diplosis*. *Hyperchiria* is he has usually found rather rarely; but this year he has received it from corn, where it was feeding in considerable numbers.

Scolytus rugulosus is common in the experiment orchard and very injurious, but does not attack healthy trees. Only such as have been injured in some way seem to be infested.

Lumbricus, sp. Quite young worms have been sent from the celery gardens of Northern Indiana, with the complaint that they injured the young plants, first in the hot beds, and, later, in the field after transplanting. The injury has been of quite a serious nature. The Buffalo tree-hopper, *Ceresa bubalus*, was sent from Richmond, Indiana, June 12, with the statement that they were destroying young tomato plants in gardens. The three specimens received were yet in the larval stage, and were at once placed on young plants in breeding cage. They attacked the plants just above the surface of the ground, puncturing the stems, causing a contraction and weakening of the stem, which soon fell over, though the upper portion did not wither or at once die. The affected part formed a distinct contraction, which was probably an eighth or an inch in length, and discoloured. Precisely similar attacks were made on a species of Tasmanian *Oxalis*, which stood upon the same table with the tomato plants, when the tree-hoppers were allowed to gather upon the stems. The last of the depredators finished the pupal stage on July 8.

The following species have been observed attacking the blackberry:—*Coleophora*, sp. The larvæ were observed eating into the tender expanding buds in April, and in May they were observed mining the leaves. No adults were reared, though attempts were made to do so; *Blennocampa paupera* was observed ovipositing in the young buds in April; *Anomala binotata*, adults were surprised in the act of depredating on the foliage early in May, and an allied beetle, *Trichius piger*, was observed feeding upon the blossoms in June. The larva of *Eccopsis permundaria* was found eating into the fruit in May, the pupal stage lasting twelve days, and the adult emerging May 21.

The clover hay worm, *Asopia costalis*, was found in abundance in northern Ohio, April 27. Pupation was observed among these May 25; adults emerged June 12. These last oviposited June 13-17, and apparently these larvæ were found in heads of living clover in breeding cage July 1st. Adults made their appearance on August 8, at which time pupæ and also half-grown larvæ were to be found in the cages.

Sandalus petrophya, male and female, were observed at La Fayette, Indiana, on red or swamp maple, *Acer rubrum*.

Mr. Kellicott said *io* frequently does not separate until nearly full-

grown. He found a lot on chestnut, two of which pupated and emerged the same fall, the others remaining in pupa until the following spring.

Mr. Osborn stated that his experience with *io* at Ames was similar to that described by Mr. Kellicott, and he asked whether *Asopia farinalis* ever occurs in clover hay. He at one time found the imago very abundant where clover was badly infested, but he could not say the larva was that of *farinalis*. No one present was able to answer.

In reply to a question, Mr. Webster said he had seen the Cecidomyid larvæ feeding on the Aphids.

Mr. Ashmead said the habit is not uncommon. He has bred predaceous species himself, and Mr. Fletcher has recorded a similar occurrence.

Mr. Howard thought the habit could scarcely be called a common one; he recollected only two European records of that character.

Mr. Lintner spoke on the occurrence of an onion pest at Canastota and vicinity, in Central New York, during the month of June. The pest was reported as a dark coloured caterpillar of a maximum length of an inch and one-fourth, feeding on the plants above ground, overrunning large fields of onions in the muck lands north of Canastota, and consuming not only all of the onion tops but other vegetation also. From the account given, the caterpillar was believed at first to be the species of cut-worm that in the spring of 1885 proved so exceedingly destructive in the onion fields in Goshen and vicinity, in Orange County, N. Y., as recorded in Prof. Riley's Report to the Department of Agriculture, for the year 1885, viz.: *Agrotis messoria*. Comparison of the caterpillar secured later, showed it to be a different species, which, on being carried through its final stage, confirmed the identification of it which had been made from Prof. Forbes's admirable figure in his 15th Report, as *Agrotis ypsilon*. The moths emerged from the pupæ in the early part of July.

It was not possible at the time to visit the infested locality to note particularly the habits of the cut-worm and the amount of injury inflicted by it, nor could any definite or satisfactory information be obtained by correspondence, for the attack ceasing with the pupation of the larvæ, all further interest in it on the part of the onion growers seemed to be lost.

Mr. Lintner also read a letter from Mr. Geo. F. Shepley, asking for information concerning an insect which had bored galleries in the pine boards and in the linen contained in a closet, and had done much injury to the fabric. He asked whether any members recognized the attack.

Mr. Riley said the description was so indefinite that little could be made of it. A number of Ptinidæ made galleries somewhat as described ; but without seeing the injury he would not venture an opinion.

Mr. Campbell stated a somewhat similar experience. From some spruce boards, employed in building, a small species of *Monohammus* issued. He suggests that the linen was bored simply to get out, and not because the insects had any liking for the material.

Mr. Mann observed that in his laboratory fittings white pine was used for shelving and drawer cases, and that from this issued a longicorn which he thinks was *Xylotrechus colonus*. He thinks they would have penetrated linen or any other substance to make their way out.

Mr. Smith noted the capture of *Cicindela lepida* at Jamesburg, N. J., July 4th, 20 miles from the nearest sea shore at which this insect had been previously found.

The Elm leaf beetle had been again closely watched during the past season, and again the insect had been found to be single brooded. The injury done first by the hibernating beetles, then by the larva, and again by the new brood of beetles, has given the impression of as many broods.

Zeuzera is undoubtedly spreading. It has been found beyond Newark, and the injury by the larva was beginning to be apparent on the elms of that city. The suggestion by Mr. Southwick at the meeting of the Association of Economic Entomologists, that elm had been referred to as the only food plant, was true only of America. In Europe it had been known as injurious to quite a number of widely different species.

Cryptorhynchus lapathi was spreading and was doing serious injury to willow. Nearly all the clumps of willows near Newark and Arlington had been destroyed, and some fancy and garden trees had been killed.

Mr. Howard said Walker had years ago given North America as a locality for *Zeuzera pyri*, and Morris had made the same statement. He asked whether this did not conflict with the idea that it was a recently imported species, and further, whether Walker might not have had the species described by Herrich-Schaeffer.

Mr. Smith replied that Morris had followed Walker simply, and that Walker's specimen must be examined and its history ascertained before its identity could be assumed. The species described by Herrich-Schaeffer was so entirely different that even Walker could not well mistake it. He had so little faith in Walker's determinations that he would not be surprised to find the American specimens to be *Ecpantheria*.

Mr. Howard further suggested that the elm-leaf beetle would be a good subject upon which to try the importation of parasites. Three species were known to infest it in Europe.

Mr. Riley expressed some surprise at Mr. Smith's experience with the elm-leaf beetle in New Jersey. At Washington he felt quite certain there were two broods, and New Jersey did not usually differ much in such matters from Washington. The date of hibernation—early August—was so very early as to be remarkable, and proved certainly that temperature had nothing to do with it.

Mr. Smith agreed that usually Washington and New Jersey did not differ in number of broods; but he had carefully watched these insects two years in succession, from day to day, and felt absolutely certain as to his facts. The beetles first ate round holes in the leaves, eating the entire tissue. The larvæ then ate on the under or upper side, usually the former; but did not eat through the leaf. This often killed off the foliage, leaving it dry and brown. A new growth would then usually start, and this in turn was injured by the midsummer beetles eating round holes in it. These beetles were never observed copulating; but after eating a week or two they retired. In the belfry of the college building hundreds had been found early last September, entirely torpid.

Mr. Riley said Mr. Smith's observations agreed perfectly with what he had noted; but he was not ready to admit that it was all caused, in Washington, by one brood. He felt quite certain that he had observed a second brood, which to some extent overlaps the first.

Mr. Lintner said, a strange feature was the habit of feeding quite extensively in fall, and then again in spring. He thought fall feeding should bring full maturity, as during hibernation they were almost torpid, scarcely even breathing. He had been watching the spread of the insect along the Hudson, and it has now reached to within twenty miles of Albany. He expects to hear of it there almost daily.

Miss Murtfeldt gave a brief account of a case where the screw-worm, the larva of *Lucilia macellaria* or something very like it, had attacked a lady near St. Louis. Over 200 of the larvæ were taken from the head and throat by means of forceps, and the patient must have suffered tortures. The larvæ differ a little from the figures she had seen, and she asked to have her determination verified.

Mr. Weed examined the specimens and thought there was no doubt of their being the screw-worm.

Dr. Marx made the announcement that he was now studying the ticks, but found considerable difficulty in getting material. He asked all members of the Club who had specimens, or could obtain them, to send to him for study. He would be glad to name and return material.

On motion of Mr. Mann the meeting adjourned.

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OFFICIAL MINUTES OF THE MEETING OF THE ENTOMOLOGICAL CLUB OF THE A. A. A. S., 1891.

(Continued from page 222.)

AUGUST 20, 1891.

The Club met pursuant to adjournment at 9 a. m., President Osborn in the chair. Eighteen members present. The minutes of the first day's meetings were read, amended and approved.

Mr. Lintner spoke on

THE PEAR MIDGE, (*Diplosis pyrivora*) IN NEW YORK.

It had been brought to his attention as an injurious species during the present year. It has been abundant at Catskill, and in small numbers has extended to within 20 miles of Albany. After careful search he has found a single infested pear at the latter city. He gave a history of the investigations made in this country on the species, and detailed all that was known concerning its life history. The character of the injury done was carefully described and specimens were exhibited. He also gave a history of the experiments made to control the species, and spoke approvingly of a suggestion that some application to completely blight and destroy the blossoms of infested orchards, more particularly the Lawrence trees, be made to exterminate the pest. It is so numerous, 15 to 35 larvæ in a single pear, and 90 % of the entire fruit infested, that he ranks it among the most injurious, and with the pear *psylla* the most serious obstacle to pear growing in New York.

The larvæ mature about the first of June. They then emerge from the pears, usually during or after a rain, drop to the ground and bury themselves a short distance. In 10 days they make a cocoon covered with grains of sand; but how long they remain before pupating he could not say. He asked whether Mr. Smith's statements concerning methods of oviposition made before the Association of Economic Entomologists

was based on personal observation. It was at variance with the descriptions of this operation and somewhat surprising.

Mr. Smith replied that he had never watched oviposition, nor had it been watched in this country so far as he was aware. His statements were inferences based on examinations of infested fruit. The passage from the ovaries to the outside of the pear was large and open, so no necessity existed for a puncturing of fruit by either insect or larva. He further found that in a lot of infested pears placed on moist earth, most of the larvæ left the pear by this same aperture.

Mr. Lintner expressed surprise at this, and described his experience, which was that the fruit usually cracks transversely near its base, and that the larvæ make their way to the surface through these cracks.

Mr. Southwick asked as to the best way to breed *Cecidomyidæ*. He had been very unsuccessful with some species he had attempted to rear.

Mr. Smith thought no general rule could be laid down, as the habits of the insects differ so much. Our effort must be to keep them in natural conditions as much as possible.

Mr. Lintner agreed to this and added, that there was much difference in the ease with which species could be bred. With some, success was very difficult.

Mr. Fletcher found them easy to rear as a rule, if they were given the constant care and attention necessary. He thought the blighting of the blossoms might be done without injury to the tree, as the blossoms of many varieties expanded before the leaves appeared, and even if some leaves were destroyed at this season the injury would soon be repaired.

Mr. Lintner asked what material could best be employed?

Mr. Fletcher suggested the arsenites, and preferably London purple on account of its causticity.

Mr. Howard asked whether Mr. Fletcher had considered what effect this would have on the bees.

Mr. Fletcher said he had not. It was an off-hand suggestion; but sulphate of copper might be substituted, and would not, he thought, hurt bees. He was, however, rather sceptical as to the injuries to bees from spraying flowers, and intended next spring to experiment on this question.

Mr. Osborn asked whether the midge was confined to pear or was known to attack other fruits? He explained that he had found a *Cecid-*

omyid larva on choke-cherry, with habits very like those described, and thought it might possibly be the same.

Mr. Fletcher thought it unlikely that a pear insect would be found on *Prunus*. It might possibly be found in some allied forms like *Cratægus*, as is *Anthonomus 4-gibbus* at Ottawa.

Mr. Howard gave some notes on

THE ENCYRTINÆ WITH BRANCHED ANTENNÆ.

He gave a history of the gradual discovery of these aberrant forms, a box of which he exhibited, and explained by means of blackboard figures the nature of the curious antennal modifications. Excellent drawings of the species were also exhibited.

In response to a question from Mr. Osborn, he stated that one of the species was bred from *Bucculatrix*; but that the hosts of the others were not known.

On motion of Mr. Kellicott, the President appointed Messrs. Kellicott, Smith and Howard, a committee to nominate the officers of the club for next year.

The Club then adjourned until 1 p. m.

AFTERNOON MEETING.

The Club reassembled at 1 p. m., with President Osborn in the chair and twenty-seven persons present.

A paper by Mr. Hubbard being called for,

Mr. Schwarz stated that the communication to be presently read by the Secretary was not an elaborate paper, but a private letter hastily written by the author while still in the field. The insects mentioned therein had, of course, not yet been studied, and could only be determined by Mr. Hubbard after his return. But on account of the highly interesting information it contained, the letter was eminently fitted to be laid before the Club. No previous observations on the insect life in the Hot Springs of the Yellowstone Park seem to have been made, although this interesting locality had frequently been visited by scientific parties. In fact, beyond Dr. Packard's short article in the American Naturalist on a *Stratiomys* larva from a hot spring in Colorado, he was not aware that anything had been published in North America on the insect fauna of Hot Springs. Further, there was very little recorded of the general insect fauna of the Yellowstone Park, and he even remembered having seen

somewhere a statement in print to the effect that the Park is remarkably poor in insect life. It would appear from Mr. Hubbard's letter that this notion had to be considerably modified, at least so far as the Coleoptera are concerned.

The Secretary then read the following paper :—

INSECT LIFE IN THE HOT SPRINGS OF THE YELLOWSTONE NATIONAL PARK.

BY H. G. HUBBARD.

Pleasant Valley Hotel, August 7, 1891.

"The arrangements we had to make with the proprietors of the stage line gave us a trip of five days from Beaver Canon to the mammoth Hot Springs for \$35 apiece, there being three of us. But if we stopped over anywhere it was \$10 extra; it was also \$10 extra to make the trip to Yellowstone Lake. But I am very glad we did not omit this, as it is by far the most delightful part of the Park. As the distances in the Park are tremendous, you can imagine I had not much time for collecting, and most of the insects I did get were taken when I could get out and walk while the carriage was going up some long hill. However, we had an entire day at the middle and upper geyser basins, as we had to travel only eight miles. There were hundreds of pools and geysers to visit which would have more than occupied the entire day if I had not skipped most of them. I, however, saw three of the large geysers play, and that was quite sufficient. These geysers and hot springs always build up either a hill, or if there are many of them together, they form, perhaps, immense terraces, covered with pools full of boiling water, and generally running over in thin streams. Millions of insects fall into these transparent pools, or get suffocated by the steam, and their dead bodies are floated to the edge of the basin, and there, in a few hours, they are coated with lime. Around all the pools and geysers and everywhere in the Park, where hot sulphurous water is running over the ground and forming tepid or hot pools, there is to be found *Cicindela hamorrhagica*. At the mammoth hot springs on the terraces, where the hot water forms shallow basins, I saw this *Cicindela* running along the edge of the flutings, where the water, quite warm, was pouring over the rim. They did not hesitate to run in the water where it was one-eighth of an inch deep. I thought they must be there for some predatory purpose, so I examined these basins carefully, and, sure enough, there were thousands of minute gnats

emerging from the pupæ, which floated up against the edges of the basins and pools. The larva was also abundant in the geyserite precipitate that forms a flocculent mud in all these tepid basins. I soon found that this mud is alive with insects, chiefly Diptera, but there is a very large and white *Ochthebius* and its larva, and also a common *Philhydrus*. The latter lives only in the tepid pools, while the *Ochthebius* inhabits water that is very much warmer. I regret that I had not a thermometer with me to test the temperature. There is, of course, a little *Salda* running about the edges, and this seems to stand any amount of heat, as I find it about the edges of springs which are actually boiling. But the most curious thing of all is the presence of two species of *Nebria*—one of large size, with yellow legs; the other smaller, and entirely black, living under pieces of geyserite about the hot springs, and even on the sides of the cones of the largest spouting geysers, where they are liable to be washed away in a flood of boiling water. The larvæ of these *Nebrias* live also in the sulphurous geyserite sand near the hot springs and geysers, but not so near to the geyser vents as the imago. There is, however, a large *Bembidium*, with variegated elytra, which is always found under bits of geyserite and in the geyserite sand about every hot spring and geyser; its larva lives with it in the same places.

In the Firehole River, just below the Excelsior geyser, which continuously pours rivers of boiling water into the stream and raises its temperature to probably 70° or 75° F., there lives an *Elmis* of medium size; but I found it rare and had not time to collect it in any numbers. In a small stream of tepid water, running through a grassy plain, I found that same slender, undescribed *Elmis* which we took below the old powder mill in Ogden Canon. It swarmed in this stream in countless millions, every stone and stick was alive with it and its larva. There was also a *Corixa*, apparently the same species I took in Utah Lake. Here it swarms in incredible numbers, forming black masses all along the sides of the stream. Of course the stream was sulphurous and heavily charged with mineral matter, so that sticks, moss and everything that fell into the water was soon silicified or coated. All the stones and sticks in the bottom were streaming with peculiar algæ of various colours. In the Firehole River, above the upper geysers, where it is an ordinary mountain stream and quite cool, I found in debris in the water a marvellous *Elmis* with red spots; but four times larger than the largest I ever saw. In the same debris were peculiar aquatic larvæ, apparently Coleopterous, and

belonging to different families, but I did not get the imagos.

I found here, at the upper geyser basin, a few things on the spruce trees, but nothing new. There are one or two *Telephorus*, *Corymbites*, several *Dasyllidæ*, etc. *Malachiidæ* of the genera *Dasytes* and *Listrus* are also common here as elsewhere on spruce and pine. Nowhere else in Yellowstone Park have I been able to find anything on pines except these Malachiids. Beating trees and bushes seems to produce nothing at all. At the upper geyser basin there was a large meadow, which had over part of it a deposit of alkaline mud, dry and cracked in the sun. Here I find a gigantic *Aphodius* with variegated elytra (*A. hamatus*?) under cow-dung. Only one specimen was alive, the others had been killed by the hot sun, and their dead bodies were very abundant on the mud or under dry dung. An *Elaphrus*, apparently *E. ruscarius*, was running about on the mud in the hot sun. In patches of cyperaceous grass in this alkaline plain I got a large Patrobus-like Carabid, or else a peculiar *Pterostichus*. There was also a *Stenus* under the dead grass.

On July 27th, at evening, we arrived at Yellowstone Lake. The shore of the lake, which I was not long in visiting, consists either of glacial boulders, or beaches of rather coarse, black gravel. No insects are thrown up by the waves at present, except, perhaps, an occasional Hemipter or *Coccinella*. However, there is a beach fauna, consisting of the usual black *Cryptohypnus* of large size (*C. funebris*), a large black *Anthicus*, which is very common, and a much rarer species quite minute in size. To my great surprise I found here a single specimen of that same peculiar Coleopterous larva (*Saprinus*?) with maggot-like body and almost obsolete legs, that I found among the Ephydras on the shore of great Salt Lake. There were also a few species of dark bronze or black *Bembidium* and an *Amara*.

On July 29th we were on the road from the Grand Canon to the Mammoth Hot Springs, which we reached late in the afternoon. I visited the nearest group of hot springs and found the usual fauna. The neighbourhood is cavernous, and a river of hot water runs beneath the hotel. Under stones there are crickets, which evidently belong to a subterranean species. We spent the next day at the mammoth hot spring, and I had a good chance to collect. I found the *Ochthebius* and other things in the hot water on the terraces, and under stones a good many *Amara*, *Pterostichus*, *Patrobus*, etc. A cedar appears here for the first time, and is growing on the terraces formed by the hot springs. On this I found, by beating, a

beautiful mottled *Anthicus* ; not at all rare, and a few other things, Malachiidæ and Curculionidæ, etc.; among them a beautiful Otiorhynchid, with cream-coloured elytra, showing metallic copper-red colours beneath. On cedars below the hotel there was a *Helops*, some *Cistelidæ*, *Elateridæ*, and one specimen of a very large Longicorn of a genus allied to *Anthophylax*. Under loose stones on the dry hillsides I found good Carabidæ, *Harpalus*, *Amara*, *Pterostichus*, and a *Cymindis*, quite common. Continuing down the mountain side about 1,000 feet I finally reached the Gardiner River, which is a cool, rapid, mountain stream, bordered with tall willows, larch, birch, aspen, wild rose, cherry, etc. Here I find covered beaches with an abundance of *Nebrias* of several species. A large one, with yellow legs, may be the species found about the geysers. The black species are either very variable, or there are several species among them. I think the smallest, which has a tendency in some localities to become brown in colour, is not a *Nebria*, but belongs, perhaps, to *Pelophila*. There is also a very elongate black form which resembles a *Patrobus*, but is of very large size. Here I found a very neat *Elmis*, quite different from those known to me. It is moderately large, uniform dark-bronze in colour, and of very short, thick, form. It lives very differently from any *Elmis* I ever saw. It is *under* small stones close to the shore, and can only be found by disturbing the gravel with the hand, whereupon the beetles are upset and float about in the water, and seize upon the rootlets of willows that grow among the stones. This same Elmid I have found since in a little trickling stream which came down the steep bank of the Yellowstone River near this place. This little stream was as cold as ice, and densely shaded with nettles and a very tall umbelliferous plant. The Gardiner River was the first stream I had found that is a natural mountain torrent. All the streams in the western part of the Park are vexed with devils of one sort or another in the shape of hot water, sulphur and steam, and are full of queer, slimy algæ, deposits of lime, etc. The Yellowstone River which flows near me here is also partly sulphur water, but still it is full of trout, and its shores produce all the species of *Nebria*, *Pelophila* and *Patrobus* that I have mentioned. I find also in shady places, where moss grows under willows by the borders of the streams and in debris, a few *Bledius* and *Micrædus*, with one or two other *Omalini*. Deep in a pile of debris on the shore of the Yellowstone River near here I found also *Dianous*.

On July 31st we took a carriage from Mammoth Hot Springs and

came to this place. The distance is 18 miles, and the road ascends a high mountain chain and then descends into this valley, which is close to the junction of the East Fork with the Yellowstone, and is 15 or 20 miles below the Grand Canon. We are here in a most beautiful country of great diversity, and almost never visited by tourists. There are dense forests of spruce and fir, some of the latter reaching a good size; there are also parks and meadows, lots of streams, from the great Yellowstone River to the smallest brooklet. Rocks, grass-covered hills, wild flowers, desert plants, abound in infinite variety, and there are also warm springs near at hand. We are all of us very much pleased, and I have good collecting, while the freshest and most bracing mountain air invigorates all of us."

In commenting on this paper, Mr. Schwarz remarked that the glistening surface of large bodies of water was known to attract many insects, but that in the case of the hot springs of the Yellowstone Park, which are of small extent, we must in all probability seek for another cause to account for the multitude of insects that fall into the hot water. It appeared quite probable that the gaseous exhalations of these springs and geysers would prove to be the attractive cause, and he recalled the fact that at the solfataras of European volcanoes large numbers of suffocated insects had been observed, the presence of which could hardly be due to accident. Similar observations had also been made at the solfataras near Santa Barbara, Cala. Among the Coleoptera, found by Mr. Hubbard in or near the hot springs, the *Nebrias* are of especial interest, because we had hitherto been accustomed to associate the occurrence of these Carabids with cold streams and snowfields in alpine regions.

Mr. Lintner expressed his appreciation of the character of the paper, and complimented Messrs. Hubbard and Schwarz on the excellent service done by them in working up the fauna of special regions.

Mr. Lintner spoke on

THE PEAR PSYLLA (*P. pyricola*) IN THE HUDSON RIVER VALLEY.

He gave a review of the history of the species, described the methods of injury and discussed the possible remedies. He finds unexpected success in using the kerosene emulsion even against the mature insects. He briefly discussed the life history, finding that there were two broods at least. The eggs and method of oviposition were described, particular attention being called to a filament or pedicel-like prolongation of the tip.

Very severe injury had been done during the present year by the insect in the pear orchards of the Hudson River Valley.

Mr. Schwarz said that four species had been confused as *Psylla pyri* by various European authors ; that Dr. Franz Loew had, in the Verh. z. b. Ges. Wien, written exhaustively on the subject, and that Schmidberger's *pyri* is identical with *pyrisuga*, Foerster, which does not occur in North America. He had observed *pyricola* in Michigan, where it is not common and where, late in the fall, it assumed that intense coloration which indicates hibernation in the imago state.

Mr. Lintner spoke further

ON THE EYE-SPOTTED BUD-MOTH (*Tmetocera ocellana*) IN WESTERN
NEW YORK.

This insect had been very destructive in the orchards of the western part of the State—many of the orchardists representing it as having caused them more harm in their apple orchards than all other insect pests combined. The caterpillar fed upon the unopened buds, on the blossoms, on the young leaves as they first put forth, webbing them together, on the advanced foliage, and it was also reported as boring into the young twigs. Its habit of concealment, after its operations disclosed its presence, made it almost impossible to reach by the usual application of the arsenites. From the severe injury that it was occasioning, it was very desirable that some method of destroying it should be discovered and recommended to our fruit growers. He had believed that eggs were deposited in the month of April by the parent moths, from some imperfect and denuded specimens that had been captured fluttering about the fruit trees at this time, and which seemed to be that species ; but Prof. Fernald and others had stated that the insect hibernated as a half-grown larva under a silken tent spun upon the fallen leaves. Some of the larvæ which Mr. Lintner had hatched from the eggs in June, had attained such size in early July when they died, that they should certainly have attained full maturity during the early autumn. He also exhibited specimens of the very remarkable, extremely flattened and disc-like egg, which he thought could not be the same with that which Prof. Fernald had described in Bulletin No. 12 of the Hatch Experiment Station for April, 1891. If the egg is deposited in the early spring, it could be killed by a kerosene emulsion ; if the larvæ hibernate in the fallen leaves, they could be kept from ascending the tree, or destroyed by collecting and burning the leaves.

Mr. Fletcher had found larvæ on apple twigs in winter in Nova Scotia, hibernating beneath a silken covering, which he thought were undoubtedly this species. He had also secured eggs during the past summer at Ottawa, where it had been one of the notable pests of the season.

Mr. Lintner also made remarks

ON SOME OF OUR ORGYIAS.

Some time since Mr. Smith named some specimens of *Orgyia* in his collection as *O. definita*, stating that there were no *leucostigma* in the Albany collections to his knowledge. More recently Mr. Dyar had seen the specimens, and had pronounced them all *leucostigma*. He also pointed out that the egg mass of *leucostigma* is covered by the female with a frothy mass. That of *definita* is almost bare, having only a slight covering of hairs, and there is no frothy substance whatever. He had reared from eggs received from Mr. Dyar a specimen of *definita*, which certainly seemed distinct from what he had in his collection. He had also bred *O. nova*, which deposited its eggs in a single layer upon the surface of the cocoon, without any covering whatever.

He had been especially interested in this latter species because of its supposed resemblance to the European *antiqua*, and would endeavour to get the early stages of both for comparison.

Mr. Smith said that the late Mr. Hy. Edwards had made such comparisons, and had frequently stated positively that they were identical. Concerning his determination of *definita*, he had just been working over the Meske material in the museum collection, which contained only what he took to be *definita*. Mr. Lintner's specimens were seen soon after, and were so well marked and clean that he deemed them the same, and said so. Since then he had seen the egg masses on trees at Albany, and finds them *leucostigma*. He had long known of the difference between the egg masses. Mr. Lintner had very few specimens; and he can only believe that the finest and most sharply marked specimens were retained, and these looked quite different from the normal, obscure and shabby specimens taken.

Mr. Lintner assented, that only the finer specimens had been retained.

Mr. Riley said that he had carefully compared *nova* and *antiqua* in all stages and found them identical.

Adjourned until the 21st inst. at 9 a. m.

AUGUST 21, 1891.

The Club met at 9 a. m., President Osborn in the chair, 27 persons present. The minutes of the second day's meetings were read and approved.

Mr. Mann stated that some enquiry had been made concerning the old minutes of the Club, of which all trace seemed to have been lost. He heard the remark, and remembered that they were in his possession. He gave a history of the Club since its organization in 1874, of its formation as a subsection of the A. A. A. S., which was not a success, and of the reorganization at the Minneapolis meeting, since which time it has flourished. He now turned over to the Secretary the book and its contents.

Mr. Kellicott moved that the Secretary be empowered to complete the minutes from published records, so far as they were obtainable and had not been already incorporated in the book. Carried.

The Nominating Committee reported, recommending for election :—
President, E. A. Schwarz, of Washington, D. C.

Vice-President, E. A. Popenoe, of Manhattan, Kansas.

Secretary, C. L. Marlatt, of Washington, D. C.

On motion the report of the Committee was unanimously approved, and the above gentlemen were elected accordingly.

Mr. Mann, from the committee to consider the recommendations of the President's address, presented the following report :—

To the Entomological Club of the A. A. A. S.:

Your committee, appointed to consider the recommendations contained in the annual address of the President, has attended to its duty, and begs leave to report.

In regard to an international meeting of entomologists, to be held in 1893, your committee deems the suggestion an excellent one. It is of the opinion that such a meeting should be held in connection with the meeting of the A. A. A. S. in that year, and that all entomologists should be invited thereto. It is expected that the Association of Economic Entomologists will invite and secure the attendance of home and foreign economic entomologists at its meetings, and it is recommended that the same excellent arrangement for co-operation be made in the future as was made for the meetings of this year, by which all members of the Associ

ation or the Club who have papers to read on economic entomology should be invited to read them at the meetings of the Association, and all who have papers on technical entomology or life habits be invited to read them to the Club. It is recommended that a committee be appointed to confer with the officers of the Association of Economic Entomologists to make the above suggested arrangements, if practicable, and to prepare and send out invitations, preferably in the form of a joint address from the two bodies.

In regard to the preparation of a Manual of Entomology, your committee deems it a matter of high importance that such a manual be prepared, and sees no insuperable obstacle thereto. It is of the opinion that this should be a technical work, for entomologists, rather than one calculated to interest and allure the non-entomologist. Such a work as that of Westwood's Classification, adapted more especially to the present status of entomology in this country, would be of inestimable value. In the opinion of the committee it should carry the classification to the point of the determination of genera by systematic tables, not undertaking further to describe or define the genera.

The committee recommends that the preparation of such a work be committed to several hands, and that the primary distribution of its subject matter be as follows, as nearly as practicable :—

Introduction and System—Dr. A. S. Packard.

Metamorphoses and Life-habits—Dr. C. V. Riley.

Hymenoptera—Messrs. E. T. Cresson and L. O. Howard.

Lepidoptera—Dr. J. B. Smith.

Diptera—Dr. S. W. Williston.

Coleoptera—Dr. G. H. Horn.

Hemiptera—Prof. H. Osborn.

Orthoptera—Prof. L. Bruner.

Neuroptera—Mr. Ph. Calvert.

Myriapoda—Mr. N. Banks.

Archnida (sens. lat.)—Dr. Geo. Marx.

It is expected that in the larger or more difficult groups the editors named would be at liberty to subdivide their work, and to call in such assistance as they might desire.

Respectfully submitted.

B. PICKMAN MANN.

J. B. SMITH.

JAMES FLETCHER.

On motion the report was received, and Mr. Mann moved its adoption.

Mr. Riley objected on business considerations, and detailed at some length the obstacles in the way of preparing and publishing a manual like that suggested. No definite plan had been presented, and the adoption of the report and an attempt made to carry it out might involve the Club in great difficulties.

Mr. Smith from the committee explained that all these difficulties had been realized by them, and hence, while their report was favourable, they had intentionally omitted any definite suggestions of a business character, realizing that this required much more time than they had, for consideration.

Mr. Osborn explained his views on the subject, and urged the necessity of a manual.

Mr. Mann thought such a manual must be prepared eventually, and that, with the backing of the Club, and with an array of names such as that proposed, no difficulty should be found in getting a publisher.

Mr. Riley suggested that the report be divided, and moved that the first recommendation of the committee, concerning an international meeting, be adopted. Carried.

Mr. Howard moved that the balance of the report be recommitted to the same committee, with instructions to report a well digested scheme one year hence.

Mr. Mann moved that a committee of three be appointed by the President under the first recommendation on an international meeting.

This was carried, and the President reserved the selection of the committee.

The President afterwards named Messrs. Kellicott, Howard and Fletcher.

At the request of Mr. Fletcher the official minutes of the Club were ordered to be printed in the CANADIAN ENTOMOLOGIST.

The following was then presented by the author :—

PRELIMINARY REMARKS ON THE INSECT FAUNA OF THE GREAT SALT LAKE, UTAH.

BY E. A. SCHWARZ, WASHINGTON, D. C.

The Great Salt Lake of Utah has been easily accessible for many years, and its shores have been visited by various entomologists ; so that

it seems strange that no one has hitherto published a comprehensive or even partial list of the insects occurring in that interesting locality. During the present summer, while on a short excursion to Utah with Mr. H. G. Hubbard, we had the opportunity of spending some time in the investigation of the insect fauna of the Lake. The larger portion of the insects collected by us, however, are not yet mounted, and still less determined, and the following remarks on our observations, which I venture to offer, are necessarily quite fragmentary and of a preliminary character.

The insect that, on account of the enormous number of individuals, cannot fail to attract the first attention of every visitor to the Lake, is a Dipteron of the genus *Ephydra*. Various species of this genus are known to occur in great number in salt water, and others occasionally become a nuisance in the vats and conduit pipes of salt-works. The particular species from the Great Salt Lake was first collected by Capt. Stansbury's expedition, and briefly noticed in 1852 by T. R. Peale in a letter appended to Prof. Haldeman's paper on the few insects collected by that expedition. Subsequently Dr. Packard (Am. Journ. Sc. and Arts, 1871, p. 105,) described the puparium and named the species *Ephydra gracilis*. The larva and imago still remain undescribed.

Along the sandy beaches of the ocean we usually find one or several windrows of seaweed cast up by the waves and marking the line of high tides. Similar windrows may be seen all around Great Salt Lake, but they consist exclusively* of the puparia of this *Ephydra*. The lake itself is full of floating puparia, which are gradually washed ashore, and if the breeze freshen and the waves get higher, the mass of puparia is pushed higher up the beach and forms a well-defined windrow, which can be plainly distinguished even on small photographs of any part of the lake shore. On June 13th, the most recent windrow (*i. e.* that nearest to the water), averaged nearly three inches in height and from four to five inches in width wherever the beach is sloping; at the rocky portion of the beach it was much higher, while on the flats the puparia are more spread out and form a kind of matting over the wet salt mud. Later in the season the accumulation of puparia became much greater. Investigation of the puparia on the day mentioned showed that most of them were alive, that only a small proportion had hatched, and that there was not a

*The dead bodies of various insects of other orders which have fallen into the Lake are intermingled with the mass of the *Ephydras*. Most of them are badly decayed, and the number of individuals and species thus found is very small.

single larva among them. On the sloping or rocky part of the beach the puparia rest upon dry ground and become themselves almost entirely dry. Here they remain for several days exposed to the warm sun, and it is certainly remarkable that under these circumstances they retain their vitality. ** From a tin box full of the puparia which I picked up on a dry spot on June 14th, the flies began to hatch by the thousands on June 19th. In the middle of June, the weather being rather cool, the imagoes were not very abundant at the lake. They rest on the wet sand or on the rocks, and here, in the little pools between the rocks, we observed that the flies deliberately go under the water to a depth of two or three inches. Whether they do this for the purpose of ovipositing or of feeding on the algæ has not been ascertained. On June 25th the number of flies had already considerably increased, but on July 4th, when the little bathing establishment at Syracuse, on the eastern shore of the lake was visited, the number of flies was really alarming. On this point there are numerous shallow pools close to the lake beach, between the railroad dam and the dykes of the salt works, and the flies completely covered the edges and the surface of the pools, forming an unbroken coal-black mass. No observations on other insects would have been possible under these circumstances; but, fortunately, the flies could be driven away to some extent, and the roar of the rising flies is such as to drown the noise of the railroad trains passing close by.

The question where the larvæ of this *Ephydra* breed has not been fully settled by us. Numerous larvæ were found in the pools between the large stones near the famous Black Rock. They were still more abundant in the little sulphurous streams on the salt flats, thickly clinging to the slimy, thread-like algæ, upon which they probably feed. But all larvæ from these two sources account only for a small fraction of the prodigious number of puparia along the lake. It is evident that the majority of the larvæ must live in the open lake, where numerous reefs in shallow water appear to be favourable breeding places.

Whether the numerous crustacea (genus *Artemia*) that live in the lake feed on the *Ephydra* larvæ, or whether the sea-gulls and other birds so abundant on the salt flats feed on the puparia has not been ascertained; nor did we see any trace of the Chalcid parasite reported to infest the

**During calm weather the puparia must float for several days on the lake, and it would seem probable that the imagoes are able to issue from the pupa on the surface of the water.

larva of *Ephydra riparia* in Europe. *Saprinus estriatus* is very abundant under and among the accumulated living puparia, and feeds upon them, while the larvæ of one or two species of *Dermestes*, which are also common at the same place, presumably feed only on the empty pupa shells. Very few other insects, and these only of small size (small Carabidæ, Staphylinidæ and Anthicidæ), are to be found among the puparia; but whether or not these feed upon the latter remains uncertain. A peculiar enemy of the imago fly was observed at Syracuse. Here, in the midst of the pools covered with the Ephydras, a commotion was occasionally observed as if a fish of considerable size had risen to the surface of the water. Mr. Hubbard succeeded in capturing one of these mysterious creatures, which proved to be the larva of a toad. It appeared that this tadpole comes to the surface of the water right among the Ephydras, with a dexterous motion of its tail sweeps a goodly number of the flies into its wide mouth, and retires again to the bottom of its ill-smelling abode. The toad itself, which was found by Mr. Hubbard deeply imbedded in the mud at the edge of the pools, is terrestrial and evidently nocturnal in its habits, but no doubt feeds also on the Ephydras.

Ephydra gracilis is the only insect that inhabits the open lake; but on the salt flats, where in many places the water of the shallow pools is more or less mixed with fresh or sulphurous water, various aquatic insects and insect larvæ can be found. There are here the larvæ of one or several species of *Tabanus*; a beautiful green Syrphid fly was seen to emerge from the wet mud. There are, further, the larvæ of several dragon flies at least half-a-dozen Dytiscidæ and Hydrophilidæ with their larvæ; and where there is a considerable admixture of fresh water the pools breed numerous mosquitoes and sand flies (*Ceratopogon*).

From what we saw on the beach of the lake and on the salt flats, a specialist in Diptera will find quite a number of interesting halophilous species. But we found it impossible to devote any time to this order, and all I secured was a specimen of a very peculiar slender Asilid, which was swiftly running over the mud, and seems to dislike to make use of its wing.

Next to the *Ephydra* in number of specimens comes the Heteropterous genus *Salda*, which is also well known to inhabit preferably the shores of the ocean and other bodies of saline water. What appears to be *Salda interstitialis* occurs in incredible numbers all over the salt flats

and renders the observation and collecting of other insects very difficult because, unlike the Ephydras, these Saldas cannot be driven away. The imagoes manage in course of time to get out of the way, but the ground remains covered with a multitude of jumping larvæ and pupæ. One or two other species of *Salda* occur among *S. interstitialis* but are much rarer, while the large *S. coriacea* occurred only among the sparse grass growing along the sulphur creeks. A very peculiar species of *Salda* (possibly forming a new genus) was never seen above ground, but lives nearly subaquatic on the underside of stones in sulphur springs or between the wet roots of the grasses growing close to the water. A genus of Heteroptera which we expected to see in great numbers at the lake is *Corixa*, but we were surprised to find only a few specimens of a single species (apparently *C. decolor*, originally described from Clear Lake, Cala.,) in the salt pools near Syracuse. It is possible, however, that they become more abundant later in the season. Various other Heteroptera found at the lake do not appear to be saline species, nor were there any saline Homoptera observed.

No Microlepidopterous larvæ were observed on the saline flora, but there are various species of Microlepidoptera feeding on these plants. None of them were reared; but it is possible that there are among them species peculiar to the Salt Lake region. As to the Orthoptera we were surprised at not finding anything that may indicate a saline species.* Some species of Odonata live in the sulphur creeks and some of the imagos were captured; but the same species were also seen at Utah Lake, which is fresh water.

The Coleoptera are best represented among the maritime and saline insects, and since most of our attention was devoted to this order, we found about 100 species in the immediate vicinity of the Lake, not counting those which were found drowned in the water, nor those which plainly belong to the desert fauna, of which quite a number of species

*On June 25th we found at the southern shore of the lake a considerable number of *Anabrus simplex* washed up by the waves and all badly decayed. Since we were unable to find a single living specimen of these gigantic crickets under stones, etc., anywhere near the lake we concluded that they must have bred on Antelope Island, situated about nine miles from the shore where the dead specimens were seen. But since my return from Utah I have read Dr. Aug. Forel's vivid account of the life-habits of the North African desert cricket, *Brachytrypus megacephalus*, which is a nocturnal species and lives on sandy soil in deep holes, which are closed up during day time by a hillet of sand. *Anabrus simplex* has possibly similar habits, and we may, after all, have overlooked its abodes in dry, sandy places close to the lake.

frequent the lake beach. But just as at the ocean, not every species found on the beach is maritime, so at the Great Lake not all species found on saline soil are halophilous. In fact, saline soil seems to possess great attractions to many species, which usually live on the banks of fresh water lakes and streams. This holds especially true of most species of *Bembidium* which abound at the lake. Thus the number of true halophilous Coleoptera inhabiting the shores of Great Salt Lake probably does not exceed twenty-five distributed in the following families :—Cicindelidæ, Carabidæ (*Dyschirius*, *Pogonus*, *Bembidium*, *Tachys*), Staphylinidæ (*Aleochara*, *Homalota*, *Bledius*, *Thinobius*), Histeridæ (*Saprinus*), Chrysomelidæ (*Galeruca*, *Phyllotreta*), and Anthicidæ (*Notoxus*, *Mecynotarsus*, *Anthicus*, *Tanarthrus*). How many of these are peculiar to the Salt Lake* it is difficult to tell at present, where still so little is known of the geographical distribution and mode of occurrence of the smaller and less conspicuous Coleoptera. The species found by us will be fully enumerated in a list of the maritime and saline Coleoptera of North America which I am preparing. Of particular interest is the occurrence of a species of *Pogonus*, since this genus was hitherto known in America only from the ocean shore. Comparing the Salt Lake fauna with our maritime fauna, the most striking difference is the absence in the former fauna of Tenebrionidæ and Rhynchophora** which play such prominent role in our maritime fauna. *Cicindela hirticollis* and *Mecynotarsus candidus* appear to be the only species common to the Great Salt Lake and the Atlantic maritime fauna ; but both are not strictly maritime or saline species. A few other species (*Pogonus planatus*, *Bembidium ephippigerum*, and the genus *Tanarthrus*) are known to occur also in Southern California, either at the sea shore or at saline lakes, and this distribution seems to confirm the ancient extent of the Great Salt Lake to the extreme southwest of North America.

A number of aquatic beetles live in the sulphur springs and salt ponds contaminated with fresh water ; but, with the possible exception of a *Cœlambus*, they are all species common in fresh water. Phytophagous

*Most of the species found at the Great Salt Lake will no doubt occur also at Lake Sevier, in Southern Utah, which has never to my knowledge been visited by any entomologist.

**Tenebrionids of the genera *Eleodes*, *Coniontis* and *Blapstinus* are occasionally found at the Lake, but clearly belong to the desert fauna, while certain species of *Sphenophorus*, which abound at the roots of rushes, and a few other Rhynchophora are likewise not saline species.

Coleoptera are not numerous on the saline flora, but most of them occur also elsewhere. The large *Galeruca erosa*, which, when alive, is of a bright sulphur yellow colour, feeds with its larva on a species of *Sueda*, and is clearly a saline species, though not confined to the Salt Lake region.

Concluding this hasty sketch of the Salt Lake fauna, I would say that one of the reasons why so little of this fauna has hitherto been recorded, is that most persons coming from Salt Lake City visit the lake only at Garfield Beach, which is at present the most readily accessible point of the south shore. But just at this spot the saline fauna is but poorly represented, and, moreover, the desert flora and fauna come here close to the lake. The immense salt flats which commence about one mile from Garfield Beach are rarely visited; but here is the home of the genuine salt fauna. Collecting in the semi-fluid and ill-smelling salt mud of these flats is, however, somewhat troublesome, and it would be no easy matter to bring together a complete set of the various species. Fortunately, however, the entomologist finds here assistance in an unexpected way. There are several large salt works on these flats, where numerous large, shallow ponds have been excavated for the purpose of gaining salt by the evaporation process. If there is no water in these ponds, the bottom consists of a tenacious, loam-like mud, saturated with concentrated brine, and here concealed in this mud some of the most characteristic species of the Great Salt Lake fauna (*Pogonus planatus*, *Dyschirius salivagans*, *Bledius*, (3 species,) *Tanarthrus salicola*,) can be found in great numbers of specimens.

Mr. Smith gave some

NOTES ON THE FOOD HABITS OF XYLEBORUS DISPAR.

In the latter part of June while collecting along a road, he noticed that many of the young willows and birches on one side of the road were dead. Investigation showed that in the main stem, usually about three feet from the ground, a colony of Scolytids were boring. At this time there were a few larvæ, more pupæ, but a yet larger number of newly matured beetles. The galleries were longitudinal, and up or down from a main transverse and somewhat irregular central channel, which had an opening through the bark. This gallery so weakened the stems, which were from one-half to one inch in diameter, that they would readily break. In some cases where all the insects were in the imago state all the longitudinal galleries were full of beetles, all headed toward the blind end of

the gallery, the head of one close to the tail of that preceding. The remarkable feature was in the disproportion between the sexes in appearance and numbers. The male was very small as compared with the female, and much more rounded, almost globose. The males, too, were much less numerous than the females; usually there was only one in a gallery, and he was usually at the extreme end. Mr. Schwarz has determined the species as *Xyleborus dispar*. The species has been injurious to pear, but Mr. Smith was not aware that in America it had been recorded from either birch or willow.

Mr. Schwarz was not surprised at this record, because in Europe *X. dispar* eats almost anything, being found in most widely divergent plants. In America it has been reported on pear, apple and liriodendron.

Mr. Fletcher said the species was very injurious to pear and apple in Nova Scotia, but he finds both sexes almost equally abundant, and sometimes entire galleries filled with males only.

Mr. Schwarz said that in this particular group of *Xyleborus* (genus *Anisandrus*, Ferrari), the males are usually much rarer than the females. They are wingless and never leave the burrows, copulation taking place within them. Seven North American species are known to him, but only three in both sexes, and none of the males of our species have ever been described by American authors. He added that *X. obesus*, Lec., would in all probability prove to be identical with *dispar*, the latter being variable in size, according to the nature of its food-plant.

Mr. Smith then gave a note on the

HABITS OF VOLUCELLA FASCIATA.

A lot of prickly pear was received from Ocean County some time in May or June, infested by a Lepidopterous larva which proved to be *Megaphycis bollii* or *Melitera prodenialis*, already referred to by Mr. Riley. The larvæ were counted and the leaves cut so as to make sure of their contents; but at that time nothing was noticed of any other insect. Later the caterpillars pupated, and eventually a moth appeared for every known larva. A few days after a Dipterous pupa was noticed in the jar which had been left undisturbed, and eventually some 8 or 10 Syrphid flies made their appearance. They could not have been parasites for all the Lepidopterous larvæ were accounted for, and I can only suppose that either eggs or very small larvæ were in the partly decaying flesh of the infested leaves and these were overlooked because not expected. Com-

paring the specimens with the typical collection in the U. S. National Museum, they agree in all respects with *Volucella fasciata*, heretofore not recorded north of North Carolina. In his monograph, Dr. Williston in the review of larval habits as far as known, gives *Volucella* as parasitic in the nests of bumble bees. This, therefore, adds not only a new locality, but some positive information on the habits of one of the species of *Volucella*, which is certainly not parasitic and has no connection with bumble bees.

Mr. H. E. Weed made some remarks on

THE NATURAL HABITAT OF THE SCREW-WORM.

The life-history and habits of this insect, *Comptosia macellaria*, have been given in full in recent bulletins published by the Texas, Louisiana and Mississippi Experiment Stations. A review of the literature is not necessary here, and it suffices to say that it is generally supposed to have its natural habitat in living animals.

It has been well known for some time, however, that the insect also passes through its transformations in dead flesh and decaying vegetable matter. Many observations made this season led him to conclude that the insect's natural habitat is dead flesh, as is the case with many others of the *Muscidae*.

A visit to any slaughter-house in Mississippi at this season will reveal the larvæ in very large numbers among the refuse matter thrown out. The flies may be seen ovipositing or resting upon weeds or flowers in the immediate vicinity. He has taken them by the thousands in sweeping the weeds and bushes with a net.

At the college, this year, he has collected the flies and knows of no case of screw-worm in that part of the State. If there were cases in live animals he is quite sure they would have been reported. But few cases of screw-worm have been known this season in the southern part of the State, although flies are present in large numbers. It seems probable, therefore, that the occurrence of this insect in living flesh is exceptional rather than the rule.

Mr. Mann had not seen Mr. Weed's report, but had believed that eggs were laid in wounds of animals, not in healthy tissue.

Mr. Weed said eggs were often laid in wounds, and especially where ticks had been killed on the skin, so causing a clot of blood.

On motion, the Club adjourned till 1 p.m.

AFTERNOON MEETING.

The club met pursuant to adjournment at 1 p.m., President Osborn in the chair, twenty-two persons present.

Mr. Hudson spoke

ON ELECTRIC LIGHT COLLECTING AT PLATTSBURGH, N. Y.

The season at Plattsburgh often opens in February with *Homoglea hircina* and *Xylina laticinerea*. Many rarities occur in March. Moths will fly at a temperature of 36° Fahr. The first Bombycid to appear is *Gluphisia lintneri*, early in April, *Smerinthus cerisyi*, *Phragmatobia assimilians*, *Ellida gelida*, *Audela acronyctoides*, *Feralia jocosa*, *F. major*, *Momaphana comstocki*, *Xylomiges dolosa* and many other extremely rare forms are to be obtained through such early collecting. The lamps give quarts of material which, though usually somewhat rubbed and torn, is of great value to the student for anatomical purposes, and, besides, furnishes material help in making out an important part of their life histories. Many orders are taken besides Lepidoptera. Many economic questions arise, such as the effects of this wholesale slaughter on the perfecting of fruits and seeds of plants depending to a great extent on night-flying insects for cross fertilization. Many insect allies, such as parasitic hymenoptera, aphid-eating insects, land and water scavengers, etc., are daily destroyed. What will be the effect of this new destructive force thrown on one side of a shifting balance already existing? Mr. Hudson showed types of two new Ptilodonta, *Gluphisia avimacula* and *Cerura modesta*, descriptions of which will soon appear. Much new material awaits any worker who will collect both early and late in the season. In nearly all genera of Lepidoptera, the males are much more frequently taken at the electric lights than the females.

Mr. Osborn agreed that even poor material was often most valuable for study purposes.

Mr. Smith commended the practice of early collecting. Experience has proved that some of the rarest forms in collections were scarce, only because they had disappeared when collecting began. He has this spring received from Mr. Dyar a lot of material collected at light in Manitou, Colorado, containing some supposed rare forms in great numbers, and some new species as well. The insects were nearly all poor, but valuable for study for all that.

Mr. Doran was rather interested in the idea of *early* collecting. In Tennessee he collected all the year round, and each season furnished something characteristic.

Mr. Fletcher asked whether the lights do not lose their attraction to insects after a time, and stated that such had been his experience at Ottawa where the insects had become largely accustomed to the light and were not nearly so much attracted as at first.

Mr. Hudson had found this so in Plattsburgh. Insects were very much less abundant now than when the lights were first started.

Mr. Schwarz had found that certain lights exercised a superior attraction year after year, and that they were now as good as they ever had been. He could never understand the reason why a certain light should be so attractive as compared with others immediately surrounding it, and apparently as favourably located. He did not think the fauna was much influenced by the specimens killed at lights. He was surprised to find, last June, that Salt Lake City, Utah, seemed to have no electric light fauna ; but this might be seasonal.

Mr. Smith thought it was certainly seasonal, for the late Mr. Henry Edwards had made quite an interesting collection of Lepidoptera at that point, almost all of them at the lights.

Mr. Smith, using the proof sheets of his new list as a text, made some

REMARKS ON THE CLASSIFICATION OF THE LEPIDOPTERA.

An order that is so general a favourite with collectors might be assumed to be well studied and well systematized. And yet that is exactly what the Lepidoptera are not. Characters for use are abundant, and excellent work has been done in certain groups ; yet save Herrick-Schæffer, no one has ever proposed a consistent classification of the entire order. In America such a work has been impossible from a lack of material, and the Herrick-Schæffer classification has proved too one-sided with the accumulation of new material. The order has also suffered from the large number of amateurs and superficial workers who describe an insect as belonging to a certain family or genus because it looks so, but who have not the remotest idea of the characters that really determine classification. The result when it is undertaken to arrange our species systematically, is startling, and the student soon learns that he cannot rely upon either generic or family references. There has been no system in the use of

group terms, and many so-called families are absolutely incapable of definition. A great many questions come up for settlement in the preparation of this list of Lepidoptera. Besides the editing, my work has been confined to the macro-heterocera as far as the Geometrina, and on the families there embraced a few remarks are made as explanatory of my views on the subject.

The *Sphingidæ* are well limited, and the classification is probably on a tolerably sound basis, yet there are two very distinct series that are probably independent branches from the original Bombycid stock. The *Smerinthinæ* now have their nearest allies in the *Ceratocampidæ*, while the *Sphinginæ* have their allies with the *Notodontidæ*. The *Sesiidæ*, which custom has placed immediately after the *Sphingidæ*, have nothing whatever to do with them. They are different in all stages, and save for a superficial resemblance in the imagoes, there is no relation whatever. They should be associated with the *Cossidæ*, from which they are to-day very distinctly separated; yet, besides the larval habit, the imagoes in many of the Sesiid genera have real Cossid affinities.

The *Thyridæ* are few in number, and the family is well marked.

Under the term *Zygenidæ* a most heterogenous mass has been usually classed. I long ago pointed out that none of our American species had the structural characters required by the definition of the family, and that the family, so well represented in Europe, is totally unknown in boreal America. I have, therefore, split up the series into compact groups, with family appellations.

The *Agristidæ* perhaps do not deserve to be called compact, and possibly part of the series may yet be transferred to the *Noctuidæ*.

The *Syntomidæ* are very well limited, but only feebly represented with us; nor have we many of the more typical forms, most of them resembling in appearance more nearly the *Pyromorphidæ*. The latter family is also small, well defined, and nearest to the next, the *Ctenuchidæ*, also a well limited group. The *Pericopidæ* form a natural lead into the *Arctiidæ* and *Lithosiidæ*; and, indeed, beginning with the *Syntomidæ* and running through the *Arctiidæ*, we have a fairly natural group. The *Pericopidæ*, are known to me only in the American species, and the family reference is by Mr. Hy. Edwards.

Three genera, which are probably related, are placed in the *Heterogynidæ*. This is also done on Mr. Edwards's authority, and I do not

believe that any of the genera belong to the family to which they are referred. I have not had specimens for study, and cannot say anything positively.

The *Nycteolidæ* are fairly well defined, and close relatives to the *Lithosiidæ* which follow them. This family as a whole is closely allied to the *Arctiidæ*, the presence of the ocelli only separating them.

The *Liparidæ* begin a new series of Bombyces, and the family is a fairly distinct one.

The *Limacodidæ* have been in considerable confusion; but Mr. Dyar's work promises to let in some light. In the larval state at least they were well distinguished.

The *Psychidæ* are also fairly well limited.

The *Dioptiidæ* contain only a single species, referred to the family by Mr. Grote. The reference is at least questionable, and I assume no responsibility for it.

The *Notodontidæ* are quite well represented in our fauna, and are the most noctuiform of the Bombyces. The place given them in the series is a little open to question; but not more so than in several other cases. Generic references here are very unreliable.

The *Platypterygidæ* are tolerably well limited, and not numerous in species with us.

The *Saturniidæ* I have treated monographically, and they make a very well defined family.

The *Ceratocampidæ* have many points of similarity with the *Saturniidæ* and are as sharply defined. We strike here what I consider quite an ancient type.

The *Bombycidæ* have *Bombyx mori* as type, and possibly two sub-families are indicated in the series as associated.

The *Cossidæ* and *Hepialidæ* are both very well limited, while no more related to each other than to the *Sesiidæ*.

Under the term *Noctuina* I have united the *Thyatiridæ*, *Noctuidæ* and *Brephidæ*. The *Noctuidæ* are a very complete family, in which several quite distinct types seem combined. I have not been able to find any satisfactory line of division for sub-families, and the groupings proposed by Mr. Grote are too unequal in value and too entirely indefinable for adoption.

Mr. Mann thought the division into families a decided advantage, not only from the systematic standpoint, but also from the bibliographical point of view. It much facilitated reference making and indexing and the groups could in all respects be dealt with more satisfactorily.

The following paper was then read by its author :—

LONGEVITY AND VITALITY OF ARGAS AND TROMBIDIUM.

BY MARY E. MURTFELDT.

It seems incredible that creatures as highly organized as the ticks and mites should be able to live for months and even years without food, and, in the case of some of the former, are capable of surviving even a prolonged immersion in a somewhat acrid fluid.

As an illustration of this remarkable vitality I wish to call attention to the case of two species that have come under my observation during the past year.

About the middle of April last I received from a correspondent a specimen, probably about two-thirds grown, of a species of cattle tick, determined for me by Dr. Riley as *Argas reflexus*, and supposed by him to be found only, or usually, on pigeons.

This creature had been inclosed loosely in the folds of the letter of inquiry, and the pressure in the mail bags, or perhaps the postmaster's stamp had completely expressed its sanguinary contents which were smeared over the paper. The tick, however, though almost as flat as a sheet of paper, was very much alive, and, with the intention of making some experiments upon it, it was placed in a small bottle from which alcohol had been hastily rinsed, but which was not thoroughly dried.

Here it was suffered to remain for a week or ten days without further attention. At the end of this time, happening to think of it, I found it immersed in the moisture which had collected in the tightly closed bottle, which, by the combination of the water and alcohol, had become a fairly strong vinegar. To my surprise upon shaking the tick out upon a blotter I found it apparently none the worse for its acid bath. With a view to test its powers of endurance still further it was then placed in a small, tight tin box in which was a layer of dry sand and a bit of oak leaf.

Under these conditions it still survives. A fresh bit of vegetation is occasionally introduced into the box, but there is no evidence that the

Argas makes any use of these leaves : it neither increases nor diminishes in size, nor has it, as yet, moulted, although under such conditions the latter was to have been expected. Very similar to the above was the case of a specimen of the large and beautiful scarlet *Trombidium sericeum*—an egg parasite of *Caloptenus spretus*. A number of these mites were sent to me by a lady who had received them from Texas. They were put into a glass jar upon an admixture of sand and garden soil. Some young locusts were also placed in the jar as food, since I was not able to obtain egg pods of the latter. None of the mites, however, seemed to feed, and in the course of a month or six weeks all the smaller specimens had perished. One, however, that was considerably larger than the others, was found to have buried itself in the earth, and when turned out seemed to be perfectly healthy and not in the least shrunken. Upon being restored to the jar it at once burrowed into the earth, tunneling to the bottom.

In this way, hidden from sight, except as I turned it out about once a month, it survived, without food, until the following December, when, the temperature having fallen quite low in the room in which it was kept, it succumbed to cold and perished.

It was stated that Dr. Riley had kept a specimen of this tick alive without food for seven years, and that during that time it had repeatedly moulted.

Mr. Mann stated that he had kept a bombycid larva without food for ten weeks. It did not moult during that period.

Dr. Marx stated that *Argas* breeds also on cats and dogs as well as cattle, and is not confined to pigeons. He showed by blackboard sketches how, when some of the ticks are full fed, the family characters become obscured. Where the head is normally retracted under and concealed by the dorsal surface, when gorged with blood, this character disappears, and it is hard to distinguish them from the *Ixodidae*.

Mr. Smith stated that he then had a *Trogoderma* larva alive in a vial closed with a rubber stopple, in which it had lived without food for more than a year. At irregular intervals it moults, but does not seem to change much otherwise, and does not eat the cast skins.

The following paper was read by the Secretary :—

NOTES ON TWO BORERS INJURIOUS TO THE MOUNTAIN ASH

BY D. S. KELLICOTT.

In the late publication of the Department of Agriculture on "Forest-tree Insects" three species are mentioned as affecting the trunk of *Pyrus americana*, viz: The round and flat-headed apple-tree borers and an unknown longicorn larva. I have recently found two additional species fully as injurious as those mentioned. These are *Podosesia syringæ* and *Zeuzophora semifuneralis*. The former is a well-known *Ægerian*, usually destroying the lilac and white ash; it occurs in far too great abundance in both these plants at Columbus.

In April last the mountain ashes on the Campus of the State University were discovered to be suffering from insect attacks, and search soon disclosed scores of round openings leading into the wood, each guarded by a thin shell of the outer bark; these occurred from near the ground to the branches, and in a few cases among the branches. The knife easily uncovered a pupa in the boring, and the nature of the insect was at once foreseen. The distributions of the openings led me to think that here was a case in which an *Ægerian* larva had directly penetrated the uninjured bark, but by cutting away the wood sufficiently I soon found that they had entered originally at the borders of scars and irregularities caused by some other agencies; that in their long, larval imprisonment they had burrowed up and down the stem for sufficient distances to thus generally distribute the places of exit.

The first imago appeared April 28, and by May 10 all were out. In no case were they seen to emerge later than 12 m.; nearly all did so between 8 and 10 a. m. of sunny days. Oviposition was observed to take place in the afternoon as a rule, and the eggs were laid about the edges of wounds and deformities.

Prevention, therefore, is not difficult; sound trees practically have immunity; in case of injury some of the usual means of protection should be resorted to. The pupæ may also be destroyed with a wire or by other means. In a few instances ants were seen attacking and destroying them.

The second species mentioned is a Phycid and really does more injury than the *Ægerian*. In April and May numerous loose, white cocoons were found under bark loosened evidently by the action of the larvæ preceding them. Early in May the moths appeared, escaping in

the afternoon. The first week in August larvæ were found mining under the bark, and evidently of this species; whether they are to mature and pupate this fall or defer this important change until spring remains to be seen.

The identification of the species was by comparison with examples in the National Museum. One of the specimens in that collection has a note written upon the label stating that it was taken from under the bark of the persimmon. I have also taken pupæ and cocoons from under the bark of the black cherry which appear to be identical. Imago not seen.

Mr. Smith then made some remarks

ON THE SPECIES OF CUCULLIA.

He had just completed a revision of the species with plenty of good material, and had found the species not difficult to separate. They are very closely related, and very constant, so that comparatively small characters are constant. A large amount of material from Colorado developed the interesting fact that there was a series of western species equal in number and parallel with an eastern series, and that as a whole each series differed more than the individual species did themselves. Thus far he does not know a single species found on both sides of the continent, while, besides this parallel series, each side has an oddity or two.

Mr. Schwarz said that parallel series of eastern and western species, such as described by Mr. Smith, were not rare in the Coleoptera, and asked whether in this scheme Texas was eastern or western.

Mr. Smith said neither series occurred in Texas, which had a species peculiar to itself and Arizona, and in answer to Mr. Ashmead, he said the nearest allies of the European species appeared in the western series.

Mr. Smith also made a few remarks on

STAINING INSECT TISSUES.

He had found considerable trouble in his studies in differentiating parts, and especially those structures that tend to become transparent. After considerable experimentation he had found *nigrosin* one of the most satisfactory stains for trachea and glands, and many of the membranous structures. It does not touch chitine. By the use of this stain he had followed the trachea to the tips of antennæ and into the labella of flies. Saffronin is another valuable stain, and especially for chitinous structures, for which it seemed to have a special affinity. Combining

nigrosin and saffronin often gives very pretty results. Care should be exercised not to leave the objects in the saffronin too long, as it is apt to result in a uniform and too intense colour, which is hard to get rid of. Hæmatoxylin gave very poor results, and he does not look on it with favour. Eosin is excellent where only a slight stain is desired, and has given some beautiful results. The use of such methods in studies admitting of them will solve many problems that are still obscure.

Mr. Osborn commented on the importance of such methods and endorsed Mr. Smith's suggestion as to their desirability.

Mr. Fletcher then gave some

NOTES OF THE YEAR IN CANADA.

Apple pests had been more abundant than usual. Of these the Eye-spot bud-moth had been most often complained of, webbing up the flowers and young foliage and boring down the flowering spurs. At the same time the larvæ of *Teras minuta* and *Cacæcia rosaceana* occurred also in injurious numbers in many localities. Canker-worms had done considerable damage in some localities. Paris green had been successfully used for all the above. The canker-worm had attacked the Ash-leaved maples (*Acer Negundo*) in the streets of Winnipeg and at Brandon, Man. Cut-worms were not very abundant, but the larvæ of *Agrotis ochreogaster* or *A. turris* (both forms having been bred from the same larvæ), were destructive to almost all kinds of vegetation up to the middle of July. A feature of the year had been the enormous numbers of all kinds of plant bugs. Two of his most interesting observations were the breeding of a small weevil from oats which had been identified by Mr. Schwarz as *Macrops porcellus*. He had also bred it from the young stems of *Panicum Crus-galli*, and had succeeded in breeding one parasite. It bores in the stem just above the root. An account was also given of a serious outbreak of an imported saw-fly, *Fenusa melanopoda*, which for three years had entirely spoilt the appearance of the European alders upon the grounds of the Experimental Farm at Ottawa. The native species growing near these trees was not injured. There are two broods in the year, perfect flies appearing in June and July and September. Belated larvæ had been found in the leaves as late as Oct. 19th. The larvæ are leaf-miners, and there are sometimes 15 or 20 mines in a leaf. The mines are at first separate, but after a time run together, and the larvæ all live together, frequently consuming nearly the whole of the parenchyma of

the leaves. The perfect insect is a small black saw-fly about $\frac{1}{8}$ inch in length.

Nematus Erichsonii, the imported larch saw-fly, was stated to have done enormous damage in Canada. Thousands of acres of American larch having been killed by the attacks of the larvæ.

Mr. Ashmead in comment stated that *Fenusa* is also found on the alder in Europe, and that he has no doubt it is the same species bred by Mr. Fletcher.

The Club then adjourned till 9 a. m. of the 22nd.

AUGUST 22, 1891.

The Club met at 9 a. m., President Osborn in the chair, 19 members present.

The minutes of the morning meeting of the 21st were read and approved. On motion of Mr. Mann the Secretary was authorized to make up the minutes of the afternoon meeting, and to publish the same after submitting to the speakers the report of their remarks, if deemed necessary.

The following communication from Mr. Wm. H. Seaman, 1424, 11th Street, N. W., Washington, D. C., was read by the Secretary :—

“ Having engaged in an investigation of the structure of the Photogenic organ of our common fire-fly, *Photuris pyralis*, which will be published in the proceedings of the American Microscopical Society in about two months, I would solicit information as to the habits of these insects not now in print, and especially on the following points :—

‘ Fire-flies are very numerous on the Lower Mississippi. What is the most common species there ?

‘ What is the most numerous species on the Pacific Coast ?

‘ Are the eggs luminous ?

‘ Do the insects lighten on returning to the ground as much as on rising ?

‘ Do the sexes, where both are winged, seek each other on the tops of trees or exclusively on the ground ? ’ ”

Mr. Claypole spoke on

A METHOD OF PRESERVING LARVÆ FOR CLASS USE.

He spoke of the constant care necessary to prevent evaporation of

alcohol, and the trouble with corks in general, and advocated sealing in a glass tube half filled with alcohol, or the alcohol could be entirely omitted after the insect had been killed in it, and the specimen would be free and easily studied. Specimens illustrating the method were exhibited. He seals his tubes with a blow pipe, making a sharp flame, and in this way a vial even three-quarters full of alcohol could be closed readily.

He also spoke of

A CHEAP SUBSTITUTE FOR CORK.

Cork for lining insect boxes is expensive, and he has found that soft pine, cut across the grain, formed a good and cheap substitute

Mr Osborn said Dr. Packard had also advised sealing vials containing larvæ. Where no alcohol was added it was of course necessary that the specimens be perfectly hardened. The wood to be substituted for cork must be very soft and even.

Mr. Smith said it would be very difficult to get material so free from resin that a paper covering would not be stained.

Mr. Mann said strawboard and a frame covered with paper had been suggested as substitutes for cork.

Mr. Webster said corrugated paper was very convenient for some purposes.

Mr. Claypole said all forms of strawboard or paper failed for want of elasticity in the material. Cork and wood are elastic and clasp the material firmly.

Mr. Smith said this was the objection to turf, which was otherwise a very satisfactory material.

Mr. Mann uses no lining of any kind in his boxes. He thought the pita-wood, formerly imported by him about as good as anything, and thought it could be brought in quite cheaply.

Mr. Smith said that even pita had its hard streaks, and that while generally excellent, it was not sufficiently uniform. On a small scale, for study boxes, corn pith was not bad.

Mr. Fletcher said the lower part of the stems of *Typha latifolia* is still better ; but the compressed cork now on the market is sufficiently cheap, and is excellent.

Mr. Ashmead said that in the Berlin Museum they often preserved different stages of an insect in small tubes inclosed within a larger tube.

Mr. Fletcher spoke of his experience with the acetic acid mixture, recommended by Mr. Smith at Champaign last year. He found the mixture of equal parts, alcohol and acetic acid, not the best proportion, and had added 25 per cent. distilled water with good results. He exhibited a number of specimens in this liquid, perfect in colour and shape. For white larvæ he finds it especially good, preserving form and colour perfectly. In response to a question by Mr. Doran, he said the mixture was cheaper than alcohol alone.

Mr. Marlatt asked whether the mixture was not corrosive to the skin where it was freely used.

Mr. Smith replied that where the mixture contained less than 50 per cent. of acid it was harmless. Where the skin was broken it caused an itching or burning ; but clear water readily cured that.

In answer to a question by Mr. Mann, he stated that the evaporation was not so great as with alcohol alone ; but that there was a tendency to attack cork stopples. It does not touch rubber. The advantage in the acid was its effect in preserving form, preventing the shrivelling effect of the alcohol. The insects were just as good for study and the internal organs preserved as well as in alcohol. In reply to a question by Miss Claypole, he said that for spiders it was excellent.

Mr. Fletcher asked whether anyone had used Carbolic Acid as a preservative. He had been asked to collect butterfly eggs and to preserve them in strong carbolic acid.

Mr. Mann has used a very weak solution satisfactorily, and has found that there is very little or no evaporation of the liquid.

Mr. Howard asked whether the acid had any staining effect, and Mr. Osborn whether it did not shrivel material.

Mr. Smith had never noticed any staining effect. He uses the acid to clear specimens previous to mounting in balsam, and some material gets no other treatment save a soaking in the acid. He finds that it renders tissue transparent, and that a katydid placed in the strong acid became uniformly glassy so that it could be almost seen through. It stained no part of the internal structures. Removed from the acid and placed in alcohol the insect gradually became opaque as before. It does not seem to shrivel and does not destroy very rapidly as far as his experience goes.

Mr. Claypole said it had a bleaching effect.

Mr. Riley exhibited specimens of *Megaphycis bollii* in all stages, and made some brief remarks on the life habits of the species, which he was led to do by the fact that Mr. Smith had recently bred it from prickly pear in New Jersey. His own specimens had been bred from the fruit of *Opuntia* in Florida, first received in 1877 from Mrs. Mary Treat, of Green Cove Springs, Fla., and subsequently from Mr. H. G. Hubbard, Crescent City, Fla., in January, 1883. He had had the species marked with the MSS. name *Myelois opuntiella*, and had had engravings made of all stages for many years; but as he had learned in 1882 that the insect had been described as *Metitara prodenialis* by Walker, he had never published his description, and the species was subsequently named as *Megaphycis bollii* by Zeller. According to the law of priority this last name, both generic and specific, would have to give way to Walker's. The breeding of this species in New Jersey gave it a more northern range than had been hitherto recorded.

As a supplement to the paper which was expected from Mr. Lintner, he further exhibited a box containing specimens of ♂ and ♀ *Phengodes laticollis* and *Zarhipis riversii*, and called especial attention to the larvi-form females.

He also called attention to the fact that in connection with Mr. Pergande, he had been of late making special collections and observations of *Phylloxera* at the request of Mr. Dreyfuss, who was preparing an elaborate work on them. He had found many interesting new forms and many facts that were new concerning the habits of the gall-makers on hickory. He had also found an interesting species on willow and *Nyssa*, and stated that the hickory species are much more numerous than had been supposed.

He also exhibited a box of specimens, with drawings, illustrating the life habits of *Sphecius speciosus*, which had not been previously recorded. The egg and several larval stages were shown in the specimens. One of the most interesting features is in the cocoon. There is a median band lined with silk, containing curious circular perforations which have the appearance of minute tubes reaching the exterior of the walls of the cocoon with a sort of rim, recalling in appearance stigmata. He was obliged to leave without going into further details, but hoped for an expression of opinion from others as to the object of these peculiar perforations.

Mr. Marlatt, who had assisted Mr. Riley in his work on this insect, described more particularly the structure of these perforations, illustrating by blackboard sketches. They are really distinct tubes of a gutta-percha-like appearance and consistency and differing entirely in texture from the remainder of the structure. Inwardly they were closed by a layer of silk so that they really did not perforate the entire cocoon.

In response to a question from Mr. Wallace he stated that he did not think any commercial use could be made of the cocoon.

Mr. Schwarz commented on the present state of our knowledge in the *Phengodini*. We do not know what is a species in *Phengodes*, and probably too many names exist. Of *Zarhipis* we have four named species, which must be reduced to two, *integripennis* and *ruficollis*, the latter including *riverii* and *piciventris* as colour varieties. Of several eastern species of *Phengodes* it is difficult to get specimens of the male, and we do not even know the male of the species occurring in Maryland and the District of Columbia. Prof. Riley has the only collection containing the larviform females of several eastern species of *Phengodes*; but only one of these, *laticollis*, has been connected with the males.

Mr. Mann asked whether not more than one species existed in Massachusetts. He has described in *Psyche* three forms of larvæ or females that he collected in that State.

Mr. Schwarz replied that he had never seen a male *Phengodes* from Massachusetts; but there was probably only a single species. The three different forms of luminous larvæ described by Mr. Mann may be satisfactorily accounted for by supposing one to be the larviform female imago, the second the larviform pupa of the female, and the third the larva of the male.

On motion the Club adjourned to meet again under the rules at the next meeting of the A. A. A. S.

J. B. SMITH, Acting Secretary.

ANNUAL MEETING.

The annual meeting will be held in London at the Society's rooms, Victoria Hall, on Wednesday, 25th Nov. All are invited to attend and contribute papers.

Mailed October 31st.

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The Canadian Entomologist.

VOL. XXIII.

LONDON, DECEMBER, 1891.

No. 12.

LIST OF WRITINGS OF THE LATE HENRY EDWARDS.

BY WM. BEUTENMULLER, NEW YORK.

The present list of writings of the late Henry Edwards was compiled up to 1880 by the deceased, and the titles following were added by me. Mr. Edwards, at the time he gave me the list, told me that it lacked the titles of one or two articles he had written for some newspaper in Australia a number of years ago, but could not remember on what subject they were, nor in what paper he published them. His papers on Pacific Coast Lepidoptera, Nos. 23 to 30 inclusive, were not published by the California Academy of Sciences, except as author's extras. I am informed that at that time (1877-78), by reason of the lack of funds, the Academy published nothing, and that while Mr. Edwards was in San Francisco the last time, there was some talk about publishing these papers in the Proceedings of that Society. We hope that this will soon be done, as the limited number of these papers that were printed have all been distributed by Mr. Edwards, and undoubtedly before long will be almost inaccessible to anyone not possessing a copy, and ultimately they will become lost from view altogether, if not placed on permanent record.

1871.—Notes on an extended Entomological tour made by Lord Walsingham. (Alta. Calif. June-Aug.)

1873.—Notes on Honey-making Ant of Texas and New Mexico. *Myrmecocychus Mexicanus*, Westw. (Proc. Cal. Acad. Sc., V., p. 72.)

Republished, Pacific Rural Press, May.

Republished, Am. Naturalist, VII., pp. 722-726.

1873.—Pacific Coast Lepidoptera, No. 1.—Descriptions of new or imperfectly known Heterocera. Proc. Cal. Acad. Sc., vol. V., pp. 109-113.

1873.—Pacific Coast Lepidoptera, No. 2.—On the transformations of Diurnal Lepidoptera of California and the adjacent districts. (Proc. Cal. Acad. Sc., V., pp. 161-172.)

1873.—Pacific Coast Lepidoptera, No. 3.—Notes on some Zygaenidæ and Bombycidæ of Oregon and British Columbia, with descriptions of new species. (Proc. Cal. Acad. Sc., V., pp. 183-190)

1873.—Remarks at the Agassiz Memorial Meeting, Mercantile Library Hall, San Francisco, Dec. 22, 1873. (Proc. Cal. Acad. Sc., V., p. 241.)

1874.—Scientific Notes. (Overland Monthly, 13, pp. 193, 285, 379, 484, 572.)

1874.—Pacific Coast Lepidoptera, No. 4.—Descriptions of some new Genera and species of Heterocera. (Proc. Cal. Acad. Sc., V., pp. 264–267.)

1874.—Description of *Cynips saltatorius*, Hy. Edw. (Pacific Rural Press).

1874.—Pacific Coast Lepidoptera, No. 5.—On the earlier stages of some species of Diurnal Lepidoptera. (Proc. Cal. Acad. Sc., V., pp. 325–332.)

1874.—Pacific Coast Lepidoptera, No. 6.—Notes on the earlier stages of *Ctenucha Multifaria*, Boisd. (Proc. Cal. Acad. Sc., V., pp. 344–345.)

1874.—Pacific Coast Lepidoptera, No. 7.—Descriptions of some new species of Heterocera. (Proc. Cal. Acad. Sc., V., pp. 365–367.)

1874.—A tribute to the memory of George Robert Crotch. (Proc. Cal. Acad. Sc., V., pp. 332–334.)

1874.—Pacific Coast Lepidoptera, No. 8.—On the transformations of some species of Heterocera not previously described. (Proc. Cal. Acad. Sc., V., pp. 367–372.)

1874.—Pacific Coast Lepidoptera, No. 9.—Description of a new species of *Thyris*, from the collection of Dr. Hermann Behr. (Proc. Cal. Acad. Sc., V., p. 413.)

1874.—Pacific Coast Lepidoptera, No. 10.—On a new species of *Papilio* from California. (Proc. Cal. Acad. Sc., V., pp. 423–424.)

1875.—Pacific Coast Lepidoptera. No. 11.—List of the *Sphingidæ* of California and adjacent Districts, with descriptions of new species. (Proc. Cal. Acad. Sc., VI., pp. 86–94.)

1875.—Pacific Coast Lepidoptera, No. 12.—On some new species of *Noctuidæ*. (Proc. Cal. Acad. Sc., VI., pp. 132–139.)

1875.—On the localities and habits of the various species of *Omus*. (*Psyche*, Vol. I., pp. 73–76.)

1875.—Notes on a Cochineal-bearing insect of California (*Coccus arctostaphylos*, Hy. Edw., MS.) (San Francisco Micro. Soc.)

1875.—Pacific Coast Lepidoptera, No. 13.—On the earlier stages of *Vanessa Californica*. (Proc. Cal. Acad. Sc., VI., pp. 146-149.)

Republished in the San Francisco Evening Bulletin, July, 1875.

1875.—*Darlingtonia Californica*, Torrey. (Proc. Cal. Acad. Sc., VI., pp. 161-166.)

Republished in the San Francisco Evening Bulletin, Sept., 1875.

1875.—Note on *Sarcodes Sanguinea*, Torrey, (Snow Plant of the Sierras). (San Francisco Evening Bulletin.)

1875.—Pacific Coast Lepidoptera, No. 14.—Notes on the Genus *Catocala*, with descriptions of new species. (Proc. Cal. Acad. Sc., VI., pp. 207-215.)

1875.—Pacific Coast Lepidoptera, No. 15.—Description of a new species of *Catocala* from San Diego. (Proc. Cal. Acad. Sc., vol. VI., pp. 184-185.)

1876.—Annual Address as Vice-President of the California Academy of Sciences. (Proc. Cal. Acad. Sc., VII., pp. 1-10.)

1876.—Notes on the Sugar-Cane Weevil, *Sphenophorus Sericans*, Wied. (San Francisco Micro. Soc., p. .)

1876.—Notes on *Exodes* from South California. (Pacific Rural Press.)

1876.—Destructive Locusts of California. (Pacific Rural Press.)

1876.—Botany of California, by Brewer, Gray and Watson—a notice. (S. Fran. News-Letter, Aug. 26th.)

1876.—Pacific Coast Lepidoptera, No. 16.—Notes on the Transformations of some species of Lepidoptera not hitherto recorded. (Proc. Cal. Acad. Sc., VII., pp. 19-24.)

1876.—Pacific Coast Lepidoptera, No. 17.—On the Transformation of *Colias* (*Meganostoma Reak*), *Eurydice*, Bdv. (Proc. Cal. Acad. Sc., VII., pp. 60-62.)

1876.—Pacific Coast Lepidoptera, No. 18.—Description of a new species of *Heterocampa* (Larva and Imago). Proc. Cal. Acad. Sc., VII., pp. 121-122.)

1876.—Pacific Coast Lepidoptera, No. 19.—Notes on a singular variety of the Larva of *Halisidota Agassizii*, Pack. (Proc. Cal. Acad. Sc., VII., pp. 128-130.)

1876.—Pacific Coast Lepidoptera, No. 20.—Notes on the Case-Bearing Moths (*Psychidæ*) with notices of Californian species. (Proc. Cal. Acad. Sc., VII., pp. 140-143.)

Republished in the S. Francisco Evening Bulletin, Nov., and Pacific Rural Press, Nov.

1876.—Pacific Coast Lepidoptera, No. 21.—Descriptions of two new species of the Genus *Thecla*. (Proc. Cal. Acad. Sc., VII., pp. 143-145.)

1876.—Pacific Coast Lepidoptera, No. 22.—Notes on some Diurnal Lepidoptera, with descriptions of new varieties. (Proc. Cal. Acad. Sc., VII., pp. 163-173.)

1877.—Pacific Coast Lepidoptera, No. 23.—Description of a new species of *Catocala*, and a List of the Californian Specimens of the Genus known to occur in collections. (Proc. Cal. Acad. Sc., Feb. 5, pp. 1-2.)

1877.—Pacific Coast Lepidoptera, No. 24.—Notes on the Genus *Colias*, with descriptions of some apparently new forms. (Proc. Cal. Acad. Sc., Feb. 5, pp. 1-11.)

1877.—Pacific Coast Lepidoptera, No. 25.—Description of a new species of *Plusia* from Arizona. (Proc. Cal. Acad. Sc., Mar. 5, p. 1.)

1877.—Pacific Coast Lepidoptera, No. 26.—Description of two new forms of Diurnals. (Proc. Cal. Acad. Sc., Dec. 17, p. 1.)

1877.—Notes on species of *Cicada*. (Pacific Rural Press, July.)

1877.—Pacific Coast Lepidoptera, No. 27.—Transformations of some species not hitherto recorded. (Proc. Cal. Acad. Sc., June 17, pp. 2-4.)

1877.—Notes on the Devil-Bean of Mexico, *Carpocapsa saltitans*. (Pacific Rural Press.)

1878.—Note on *Prionus Californicus*. (Pacific Rural Press, March.)

1878.—Pacific Coast Lepidoptera, No. 28.—On the occurrence of some rare species of Diurnals in California. (Proc. Cal. Acad. Sc., June 17, pp. 5, 6.)

1878.—Pacific Coast Lepidoptera, No. 29.—Description of some new genera and species of Noctuidæ. (Proc. Cal. Acad. Sc., July 1, pp. 7-10.)

1878.—Pacific Coast Lepidoptera, No. 30.—Notes on the Genus *Parnassius*. (Proc. Cal. Acad. Sc., July 15th, pp. 11-14.)

1880.—Pacific Coast Lepidoptera, by Henry Edwards. From the Proceedings of the California Academy of Sciences. Author's Copy, New York, 3 plates.

(This volume is composed of author's extras of the Pacific Coast Lepidoptera, Nos. 1-30. The title page and index were published by Mr. Edwards. A limited number of copies were issued, and only about ten contain the three plates.)

1880.—Descriptions of some new species of *Catocala*. (Bull. Bklyn. Ent. Soc., II., pp. 93-95.)

1880.—Notes upon the Genus *Catocala*, with descriptions of new varieties and species. (Bull. Bklyn. Ent. Soc., III., pp. 53-62.)

1880.—Descriptions of some new forms of *Ægeriadæ*. (Bull. Bklyn. Ent. Soc., III., pp. 71, 72.)

1881.—Introductory notice of *Papilio*. (*Papilio*, I., p. 1.)

1881.—On two new forms of the Genus *Parnassius*. (*Papilio*, I., pp. 2-4.)

1881.—Description of two new species of *Lithosidæ*. (*Papilio*, I., p. 12.)

1881.—New genera and species of N. American *Noctuidæ*. (*Papilio*, I., pp. 19-28.)

1881.—Notes on the Pacific Coast Species of *Hepialus*, with descriptions of new forms. (*Papilio*, I., pp. 35-36.)

1881.—Description of new species and varieties of *Arctiidæ*. (*Papilio*, I., pp. 38-39.)

1881.—On some apparently new forms of Diurnal *Lepidoptera*. (*Papilio*, I., pp. 50-55.)

1881.—Notes on the Pacific Coast Species of *Orgyia*, with descriptions of Larvæ and new forms. (*Papilio*, I., pp. 60-62.)

1881.—Descriptions of some species of *Catocala*, (published in Strecker's *Lepid. Rhopal et Heterocera*, vol. I., pp. 99, 100.)

1881.—A New Genus and some new forms of North American *Zygænidæ*. (*Papilio*, I., pp. 80-81.)

1881.—Description of some new species of N. American Moths. (*Papilio*, I., pp. 100-101.)

1881.—Descriptions of some new species of *Heterocera*. (*Papilio*, I., pp. 115-121.)

1881.—A new and remarkable *Bombycid* Moth from Arizona. (*Papilio*, I., pp. 171-172.)

1881.—New genera and species of the family *Ægeriadæ*. (*Papilio*, I., pp. 179-208, pl. 1.)

1881.—Biographical Sketch of Joseph Duncan Putnam. (*Papilio*, I., p. 223.)

1882.—New Species of *Heterocera*. (*Papilio*, II., pp. 9-15.)

1882.—Notes on N. American *Ægeriadæ*, with descriptions of new forms. (*Papilio*, II., pp. 52-57.)

1882.—Index to *Papilio*, vol. I.

1882.—Note on Mr. Swinton's work on "Wing Variations in Lepidoptera. (Papilio, II., p. 18.)

1882.—Powerful Insecticide—note on. (Papilio, II., p. 34.)

1882.—Swarming of *Colias Philodice*. (Papilio, II., p. 34.)

1882.—Note on Dr. Packard's Paper on Butterfly Parasites. (Papilio, II., p. 34.)

1882.—Insect Pests in California. (Papilio, II., p. 34.)

1882.—Dwarf Butterflies—note on. (Papilio, II., p. 34.)

1882.—Synopsis of Noctuidæ, by J. B. Smith—note on. (Papilio, II., p. 50.)

1882.—Bombycidæ of N. America, by R. H. Stretch—note on. (Papilio, II., p. 50.)

1882.—Obituary notice of Charles Robert Darwin, F.R.S. (Papilio, II., p. 81.)

1882.—Sale of Mr. Grote's collection—note on. (Papilio, II., p. 82.)

1882.—Early Appearance of *Actias Luna*. (Papilio, II., p. 82.)

1882.—Further notes and descriptions of N. American *Ægeriadæ*. (Papilio, II., pp. 96-99.)

1882.—On the early stages of *Papilio Rutulus*, Bdv. (Papilio, II., p. 112.)

1882.—*Papilio albanus*, Feld.—note on. (Papilio II., p. 122.)

Descriptions of New Species of N. American Heterocera. (Papilio, II., pp. 123-130.)

1882.—Obituary notice of Charles Godfrey Siewers. (Papilio, II., p. 145.)

1882.—Notice of Grote's New Check List and Illustrated Essay. (Papilio, II., p. 146.)

1882.—Fans on the Feet of Catocaline Moths. (Papilio, II., p. 146.)

1882.—Naphthaline Cones. (Papilio, II., p. 147.)

1882.—Phycidæ of the United States—note on. (Papilio, II., p. 148.)

1882.—On *Parnassius Thor*. (Papilio, II., p. 148.)

1883.—A Mingled Yarn, sketches on various subjects, New York, 12 mo., 157 pp.

This volume contains the following subjects :—

Three Weeks in Mazatlan—pp. 1-64.

Iron and its Relation to Civilization—pp. 65-85.

Shakespeare—pp. 89-98.

Address on the occasion of the removal of the Bohemian Club from Sacramento street to Pine street, December, 1876—pp. 99-105.

- Edwin Adams (obituary notice)—pp. 106-111.
 James Hamilton (funeral address)—pp. 112-115.
 Joseph Maquire (funeral address)—pp. 116-120.
 Midsummer "High Jinks,"—pp. 121-127.
 Two Balloon Voyages—pp. 131-138.
 The Church and the Stage—pp. 139-147.
 Agassiz (obituary notice)—pp. 148-150.
 Major Harry Larkyns (funeral address)—pp. 151-154.
 William Barry (funeral address)—pp. 155-157.
 1883.—Notes on the Early Stages of some Heterocera. (Papilio, III., p. 24.)
 1883.—Sphinx Sequoiæ. (Papilio, III., p. 25.)
 1883.—Rare Lepidoptera in New Jersey. (Papilio, III., p. 25.)
 1883.—Asilus and Geometers. (Papilio, III., p. 25.)
 1883.—Papilio Chresphontes, Cr. (Papilio, III., p. 26.)
 1883.—New forms of the Genus Alypia. (Papilio, III., pp. 33-34.)
 1883.—Callidryas Fisheri—Description of. (Papilio, III., p. 43.)
 1883.—Obituary notice of G. W. Belfrage. (Papilio, III., p. 83.)
 1883.—"The Caterpillar Pest," Letters to the Evening Telegram on depredations of *Orgyia leucostigma*, June 26th, June 29th, July 12th.
 1883.—On the Transformations of some species of Lepidoptera (written in conjunction with S. L. Elliott). (Papilio, III., pp. 125-136.)
 1883.—Some species of Euchaetes. (Papilio, III., pp. 145-148.)
 1883.—New species of *Ægeriadæ*. (Papilio, III., pp. 155-157.)
 1883.—Obituary notice of James Spencer Bailey. (Papilio, III., p. 166.)
 1883.—Obituary notice of John L. Leconte. (Papilio, III., p. 168.)
 1883.—Eggs of *Tolype velleda*. (Papilio, III., p. 189.)
 1883.—*Orgyia Badia*—note on. (Papilio, III., p. 189.)
 1883.—*Spilosoma latipennis*, Stretch. (Papilio, III., p. 190.)
 1883.—Etudes d'Entomologie—note on. (Papilio, III., p. 193.)
 1883.—Farewell to subscribers of Papilio. (Papilio, III., p. 193.)
 1884.—Address to subscribers of Papilio. (Papilio, IV., p. 1.)
 1884.—Notes on Mexican Lepidoptera, with descriptions of new species. (Papilio, IV., pp. 11-19.)
 1884.—Papilio Antimachus, Dr.—note on. (Papilio, IV., p. 21.)
 1884.—The Lepidopterous Genus *Datana*. (Papilio, IV., pp. 23-26.)

- 1884.—Monographs of North American Lepidoptera. (Papilio, IV., p. 38.)
- 1884.—Mexican Lepidoptera—note on. (Papilio, IV., p. 41.)
- 1884.—Some new forms of North American Moths. (Papilio, IV., pp. 43-48.)
- 1884.—Notes on Mexican Lepidoptera, with descriptions of new species (2nd paper). (Papilio, IV., pp. 59-61.)
- 1884.—Notes on Mexican Lepidoptera, with descriptions of new species (3rd paper). Papilio, IV., pp. 75-80.)
- 1884.—The Genus *Gloveria*. (Papilio, IV., pp. 105-109.)
- 1884.—Apparently new species of North American Heterocera. (Papilio, IV., pp. 121-126.)
- 1885.—New Bombycidae from Colorado. (Ent. Am., I., p. 17.)
- 1885.—New Species of California Moths. (Ent. Am., I., pp. 49-50.)
- 1885.—Notes on Mexican Lepidoptera, with descriptions of new species (4th paper). (Ent. Am., I., pp. 128-129.)
- 1885.—A New Arctian. (Can. Ent., XVII., p. 65.)
- 1886.—Notes on North American Zygaenidae and Bombycidae, with descriptions of new forms. (Ent. Am., II., pp. 8-15.)
- 1886.—Apparently new forms of N. American Heterocera. (Ent. Am., II., pp. 165-171.)
- 1887.—Apparently new species of Mexican Heterocera (5th paper.) (Ent. Am., III., pp. 89-92.)
- 1887.—Early stages of *Orgyia Nova*, Fitch. (Ent. Am., III., p. 146.)
- 1887.—Early stages of some North American Lepidoptera. (Ent. Am., III., pp. 161-170.)
- 1887.—Descriptions of new species of North American Heterocera, with notes. (Can. Ent., XIX., pp. 145-147.)
- 1887.—A New Variety of *Papilio* and a New *Catocala* from the Pacific Coast. (Can. Ent., XIX., p. 199.)
- 1888.—New Genera and species of North American Moths. (Ent. Am., III., pp. 181-185.)
- 1888.—Catalogue of the species of the Higher Families of North American Heterocera, described since Grote's "New Check List," (1882.) with those omitted from that publication. (Ent. Am., III., pp. 221-232.)
- 1888.—*Euproserpinus Euterpe*, a new species of Sphingidae. (Ent. Am., IV., pp. 25-26.)

- 1888.—Early Stages of some North American Moths. (Ent. Am., IV., pp. 61-62.)
- 1888.—Notes on Lepidoptera. (Ent. Am. IV., p. 63.)
- 1888.—Three species of Moths new to our Fauna. (Can. Ent., XX., pp. 12-15.)
- 1888.—Three Moths new to our Fauna. (Can. Ent. XX., pp. 111-113.)
- 1889.—Notes on Noises made by Lepidoptera. (Insect Life, II., pp. 11-15.)
- 1889.—Bibliographical Catalogue of the described Transformations of North American Lepidoptera. (Bull. U. S. Nat. Mus., No. 35, 147 pp.)
- 1890.—Notes on the Habits and earlier stages of *Cryptophasia unipunctata*. (Proc. Linn. Soc., N. S. Wales, V., pp. 300-302.)
- Republished in *Insect Life*, III., p. 384, fig.
- 1890.—Some apparently new Noctuidæ in the collection of the British Museum. (Ent. Am., VI., pp. 114-115.)
- 1891.—Birth of a beautiful exotic Lepidopterous Insect in New York. (*Insect Life*, III., p. 316.)
- 1891.—Descriptions of two new species of *Ægeriadæ*, published in Dr. Otto Lügger's paper on Two New Lepidopterous Borers. (*Psyche*, vol. VI., pp. 108-109.)

A CATALOGUE OF THE THYSANOURA OF NORTH AMERICA

BY ALEX. D. MACGILLIVRAY, CORNELL UNIVERSITY.

There being no published list of the American species of Thysanoura, I have thought it advisable to bring my notes together in a connected form. The names adopted are based on a careful study of many specimens from all parts of the country, and the arrangement of families and genera is a combination of that of Tullberg, Lubbock, and Comstock. I have preceded the catalogue by a list of the more important papers containing descriptions of American species, and I have followed the names of all those species known to me by an exclamation point. The specimens upon which this study is based are deposited in the Entomological Museum of Cornell University. I desire to take this opportunity of thanking Mr. Nathan Banks, Washington, D. C.; Prof. H. E. Summers, Knoxville, Tenn.; Mr. A. P. Morse, Wellesley College, Mass., and Mr. Trevor Kincaid, Olympia, Washington State, for numerous new and interesting species.

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- Comstock, J. H.—An Introduction to the Study of Entomology, 1888, pp. 53-61, figs.
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Tome V.
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—*American Naturalist*, V., (1871) p. 747.
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—*American Naturalist*, VIII., (1874) p. 501.
—*ibid.*, XI. (1877), pp. 51-52, foot-note.
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 Tellkamp, T. A.—Archiv. für Naturgeschichte, X., Bd. 1, p. 321.
 Tullberg, Tycho.—Om Skandin. Podurider of underfam. Lipur., 1869,
 —Sveriges Podurider, (1871), 12 plates.
 —Collembola Borealia, —Ofver. Kongl. Vetenskaps.
 Akade. Förhand. (1876), plates.

Suborder SYMPHYLA, Ryder.

Family SCOLOPENDRELLIDÆ, Newport.

Genus SCOLOPENDRELLA, Gervais.

1. *gratiae* Ryder. (!) Amer. Nat., XIV., (1880) p. 375; Proc. Acad. Nat., Sci p. 85, fig. N. Y., Penn., Md., D. C., Ohio, Tenn.
2. *notocantha* Gerv. Aptères, IV., p. 301, pl. 39, fig. 7.; Ryder, Proc. Acad. Nat. Sci., p. 84, fig. France, (?) Penn., Md.
3. *latipes* Scudder. Bost. Soc. Nat. Hist., XXII., p. 65. Mass.

Suborder CINURA, Packard.

Family JAPYGIDÆ, Haliday.

Genus JAPYX, Haliday.

4. *Saussurii* Humbert. Rev. et Mag. Zool. (1868), p. 345. Mexico.
5. *subterraneus* Packard. ! Amer. Nat., VIII., (1874), p. 501. Kentucky, D. C.

Family CAMPODEIDÆ, Lubbock.

Genus CAMPODEA, Westwood.

6. *Americana* Packard. (!) Proc. Bost. Soc. Nat. Hist., XIII., (1871) p. 409; Syn. Thysan. Essex Co. (1873), p. 45. Mass., N. Y., D. C., Ohio, Tenn.
7. *Cookei* Packard. American Naturalist, V., (1871) p. 747; Syn. Thysan. Essex Co. (1873), p. 46; Cave Fauna N. A., p. 67, pl. XVII., figs. 1, 1a-i. Caves of Kentucky and Indiana.
8. *Mexicana* Packard. American Naturalist, XX, (1878) p. 383. Mexico.

Family LEPISMIDÆ, Leach.

Genus MACHILIS, Latreille.

9. *brevicornis* Packard. (!) Syn. Thysan. Essex Co. (1873), p. 49 Texas, Tenn.

10. *cavernicola* Tellkmpf. *Triura cavernicola* Tell., Archiv. für naturgeschichte, X., Bd. I., p. 321; Packard, Amer. Nat., V., p. 747; Syn. Thysan. Essex Co. (1873), p. 51; Cave Fauna N. A., p. 67. Kentucky.
11. *orbitalis* Packard. (!) Syn. Thysan. Essex Co. (1873), p. 50. Idaho, Washington State.
12. *variabilis* Say. (!) Journ. Acad. Nat. Sci. Philad., II., (1821), p. 12; Le Conte Edition, II, p. 7; Packard, Syn. Thysan. Essex Co. (1873), p. 50; Lubbock, Monog. Collem. and Thysan. (1873), p. 240. Mass., N. Y.; Ind., Tenn.
13. *vittata* Burmeister. Hand. d. Ent.; Nicolet, Ann. Soc. Ent., France, (1847); Lubbock, Monog. Collem. and Thysan. (1873), p. 241. Carolina.

Genus LEPISMA, Linn.

14. *anopthalma* Bilimek. Vehr. d. Kais.-Konig. Zool.-Botan. Ges. in Wien, XVII., p. 905. Mexico.
15. *collaris* Fabricius. (!) Ent. Sys.; Gervais, Hist. Ins. Apt., III.; Burmeister, Hand. d. Ent.; Packard, Syn. Thysan. Essex Co. (1873), p. 47; Lubbock, Monog. Collem. and Thysan. (1873), p. 223. West Indies.
16. *mucronata* Packard. Syn. Thysan. Essex Co. (1873), p. 49. West Coast of Nicaragua.
17. *quadriseriata* Packard. (!) *ibid.*, p. 47. Mass., Rhode Island, N. Y. Conn., Tenn.
18. *saccharina* Linnaeus. (!) Faun. Suec.; Burmeister, Hand. d. Ent.; Nicolet, Ann. Soc. Ent. France (1847); Packard, Syn. Thysan. Essex Co. (1873), p. 47; Lubbock, Monog. Collem. and Thysan. (1873), p. 268. Europe, North America.

Genus THERMOBIA, Bergroth.

19. *domestica* Packard. *Lepisma domestica* Pack., Syn. Thysan. Essex Co. (1873), p. 48. Mass.

Suborder COLLEMBOLA, Lubbock.

Family SMYNTHURIDÆ, Lubbock.

Genus SMYNTHURUS, Latreille

20. *arvalis* Fitch. (!) Eighth Rept. Ins. N. Y. (1862), p. 673; Cucumerus Harris (MSS.), Correspondence p. 362; roseus Packard, Syn. Thysan. Essex Co. (1873), p. 43. Mass., N. Y., Ohio.
21. *elegans* Fitch. (!) Eighth Rept. Ins. N. Y. (1862), p. 674; Packard, Syn. Thysan. Essex Co. (1873), p. 43. Mass., N. Y., Ohio, West Virginia, Tenn.
22. *ferrugineus* Packard. Cave Fauna N. A., p. 67, pl. XVI., figs. 4, 4a-c. Caves of Virginia.
23. *hortensis* Fitch. (!) Eighth Rept. Ins. N. Y. (1862), p. 668; signifer Fitch, ibid., p. 675. N. Y., Ohio.
24. *quadrinaculatus* Ryder. (!) Proc. Acad. Nat. Sci., Philad. (1878), p. 335, fig. Mass., Penn.
25. *quadrisignatus* Packard. Syn. Thysan. Essex Co. (1873), p. 44. Maine.

Genus PAPIRUS, Lubbock.

26. *guttatus* Say. Smynthurus guttatus Say, Journ. Acad. Nat. Sci., II., p. 13; LeConte Edition, II., p. 8; Lubbock, Monog. Collem and Thysan. (1873), p. 115. Georgia.
27. *marmoratus* Packard. (!) Syn. Thysan. Essex Co. (1873), p. 42. Maine, Mass., Long Island, N. Y.
28. *novæboracensis* Fitch. (!) Smynthurus novæboracensis Fitch, Eighth Rept. Ins. N. Y. (1862), p. 674. N. Y., Ohio.
29. *texensis* Packard. Syn. Thysan. Essex Co. (1873), p. 43. Texas.

Family ENTOMOBRYIDÆ, Comstock.

Genus ORCHESELLA, Templeton.

30. *flavopicta* Packard. (!) Syn. Thysan. Essex Co. (1873), p. 41. N. Y., Long Island, Mass., Tenn.

Genus TOMOCERUS, Nicolet.

31. *plumbeus* Linnaeus. (!) Podura plumbea Linn., Systema Naturae;

bicolor Say, Journ. Acad. Nat. Sci. Philad., II., p. 13; LeConte Edition, II., p. 8; longicornis Muller, Zool. Dan. Prod. (1776); iricolor Say, Journ. Acad. Nat. Sci. Philad., II., (1821) p. 13; LeConte Edition, II., p. 8; Tomocerus longicornis Lubbock, Monog. Collem. and Thysan., (1873) p. 137, pls. 17 and 18; Packard, Syn. Thysan. Essex Co. (1873), p. 38; Isotoma bicolor Lubbock, Monog. Collem. and Thysan., p. 177; Lepidocyrtus iricolor Lubbock, *ibid.*, p. 157. Europe and North America.

Genus SEIRA, Lubbock.

32. *Buskii* Lubbock. (!) Monog. Collem. and Thysan. (1873), p. 145. Great Britain, N. Y.

Genus BECKIA, Lubbock.

33. *cavernarum* Packard. Degeeria cavernarum Pack., Cave Fauna N. A., p. 66, pl. XVI., figs. 2, 2 a-g. Kentucky, Indiana.

Genus LEPIDOCYRTUS, Bourlet.

34. *albus* Packard. (!) Syn. Thysan. Essex Co., (1873), p. 73, Maine, Mass., N. Y., Ohio, Tenn.
35. *atropurpureus* Packard. Cave Fauna N. A., p. 66, pl. XVI., figs. 3, 3a-b. Kentucky.
36. *bipunctatus* Packard. (!) Syn. Thysan. Essex Co. (1873), p. 37. Texas.
37. *marmoratus* Packard. *ibid.*, p. 36. Mass.
38. *metallicus* Packard. (!) *ibid.*, p. 36. Maine, Mass., N. Y., Ohio, Tenn.
39. *pusillus* Linnaeus. Lubbock. Monog. Collem. and Thysan. (1873), p. 156; Packard, Syn. Thysan. Essex Co. (1873), p. 37. Greenland, Europe.

Genus ENTOMOBRYA, Rondani.

40. *carneiceps* Packard. (!) Orchesella Carneiceps Pack., Syn. Thysan. Essex Co. (1873), p. 40. Ohio, D. C., Tenn.

41. *fasciata* Say. (!) *Podura fasciata* Say, Journ. Acad. Nat. Sci., Philad., II., (1821) p. 12; LeConte Edition, II., p. 8; *Degeeria fasciata* Lubbock, Monog. Collem. and Thysan. (1873), p. 166; 10-fasciata Pack., Syn. Thysan. Essex Co. (1873), p. 40; *Entomobrya multifasciata* Tullb. Brooks, Journ. Linn. Soc.—Zool., XVII., p. 275. Maine, Mass., N. Y., Ohio, Tenn., Texas, Georgia, East Florida.
42. *griseo-olivata* Packard. (!) *Degeeria griseo-olivata* Pack., Syn. Thysan. Essex Co. (1873), p. 39; *Entomobrya griseo olivata*, Brooks, Journ. Linn. Soc.—Zool., XVII., p. 281. Mass., N. Y.
43. *perpulchra* Packard. (!) *Degeeria perpulchra* Pack., Syn. Thysan. Essex Co. (1873), p. 38; *Entomobrya perpulchra* Brooks, Journ. Linn. Soc.—Zool., XVII., p. 281. Texas.
44. *purpurascens* Packard. (!) *Degeeria purpurascens* Pack., Syn. Thysan. Essex Co. (1873), p. 39; *Entomobrya purpurascens* Brooks, Journ. Linn. Soc.—Zool., XVII., p. 282. Maine, Mass., Tenn.

Genus ISOTOMA, Bourlet.

45. *albella* Packard. (!) Syn. Thysan. Essex Co. (1873), p. 32. Maine, Mass., N. Y.
46. *Belfragei* Packard. *ibid.*, p. 33. Texas.
47. *Besselsii* Packard. Amer. Nat. (1877), pp. 51, 52, foot-note. Polaris Bay.
48. *bidenticulata* Tullburg. *Collembola borealia* (1876), p. 35, Tab. X., figs. 17 and 18. Greenland, Northern Europe.
49. *fimetaria* Linnaeus. *Podura fimetaria* Linn., Syst. Nat., Ed. X., P. I., p. 609; *Isotoma fimetaria* Tullb., Sv. Podur., p. 48; *Collembola borealia* (1876), p. 37. Greenland, Siberia.
50. *glauc*a Packard. (!) Syn. Thysan. Essex Co. (1873), p. 33. Mass., Ohio.
51. *leonina* Packard. (!) *ibid.*, p. 32. Mass., N. Y.
52. *nivalis* Packard. (!) *ibid.*, p. 31. Maine, Mass.

53. *plumbea* Packard. (!) *ibid.*, p. 35; Guide to the Study of Insects, pl. X., figs. 6, 7. Mass., Long Island, Ohio.
54. *purpurascens* Packard. (!) Syn. Thysan. Essex Co. (1873), p. 34 Texas.
55. *quadrioculata* Tullberg. Fört öfver. sv. Podr. (1871), p. 152; Collembola borealia (1876), p. 36. Greenland, Northern Europe.
56. *tricolor* Packard. (!) Syn. Thysan. Essex Co. (1873), p. 34. Mass., D. C., Texas.
57. *Walkerii* Packard. (!) Memoirs Peab. Acad. Sci. 2 (1873), p. 19; Syn. Thysan. Essex Co. (1873), p. 34. Mass., Eastern, Ohio.

Family PODURIDÆ, Burmeister.

Genus ACHORUTES, Templeton.

58. *armatus* Nicolet. Podura armata Nic, Resch. p. serv. à l' Hist. des Podur. (1841), p. 57. Achorutes armatus Lubbock, Monog. Collem. and Thysan. (1873), p. 180; Tullberg, Fört öfver Sv. Podur, (1871), p. 153; Collembola borealia (1876), p. 38, Tab. X., fig. 35. Greenland, Siberia.
59. *boletivorus* Packard. (!) Syn. Thysan. Essex Co. (1873), p. 30. Maine, Mass., New York, D. C.
60. *marmorata* Packard. (!) *Ibid.*, p. 30. Maine, (?) Ohio.
61. *nivicola* Fitch. (!) Podura nivicola Fitch, Emmon's Journ. Sci. Agr., V., (1846-47), p. 151; Achorutes nivicola Pack., Syn. Thysan Essex Co. (1873), p. 29; Lintner, Second Rept. N. Y. Entom., p. 203. Mass., New York, Penn., (?) Wisconsin.
62. *pratorem* Packard. (!) Syn. Thysan. Essex Co. (1873), p. 31. Maine, New York.
63. *texensis* Packard. *Ibid.*, p. 30. Texas.

Genus XENYLLA, Tullberg.

64. *humicola* Fabricius. Podura humicola Fab., Fauna Groen., (1780), p. 213; Achorutes humicola Lubbock, Monog. Collem. and Thy-

san. (1873), p. 183; *Isotoma humicola* Packard, Syn. Thysan. Essex Co. (1873), p. 35; *Xenylla humicola* Tullberg, *Collembola borealia*, (1876) p. 38. Norway, Sweden, Greenland.

65. *maritima*, O. Fabr. *Podura maritima* O. Fabricius, Fauna Groenlandica; *Xenylla maritima* Tullberg, Skand. Podur af underfam. Lip. (1869), p. 11; Sveriges Poduridea, (1872), p. 52, Tab. XI., figs. 7, 8; Lubbock, Monog. Collem. and Thysan., p. 187. Greenland, Sweden.

Genus *PODURA*, Linnæus.

66. *aquatica* Linnaeus. *Podura aquatica* Linn., Syst. Nat. Ed., X., p. 609; *Hypogastrura aquatica* Bourlet, Mem. Soc. Roy. Lille (1839), p. 31; *Podura aquatica* Lubbock, Monog. Collem. and Thysan., (1873), p. 185, pl. 42; Tullberg, Sveriges Podurider, p. 50, Tab. X., figs. 1-6; Packard, Syn. Thysan. Essex Co. (1873), p. 35. Greenland, Europe.

Family *LIPURIDÆ*, Lubbock.

Genus *LIPURA*, Burmeister.

67. *ambulans* Linnaeus(!) *Podura ambulans* Linn., Syst. Nat. Ed., X., P. 1, p. 609; *Lipura ambulans* Burm., Hand. d. Entom. (1838), B. 11., p. 447; Lubbock, Monog. Collem. and Thysan. (1873), p. 189, pl. 43; Tullberg, Sveriges Podurider (1871), p. 55, Tab. XI., figs. 16-29; Packard, Syn. Thysan. Essex Co. (1873), p. 29. New York, Ohio, D. C.
68. *armata* Tullberg. Skand. Podur. of. underfam. Lip. (1869), p. 18; *Collembola borealia*, p. 39. Greenland.
69. *finetaria* Linnaeus(!) *Podura finetaria* Linn., Sys. Nat. Ed., X., P. 1., p. 609; *Lipura finetaria* Burm., Hand. d. Ent. (1838); Lubbock, Monog. Collem. and Thysan., (1873), p. 191., pl. 46; Packard, Syn. Thysan. Essex Co. (1873), p. 28; Lintner, Second Rept. N. Y. Entom.p., 208. Mass., N. Y., D. C., Ohio.
70. *Grænländica* Tullberg. *Collembola borealia* (1876), p. 41, Tab. XI., figs. 57 and 58. Greenland, Spitzbergen.

71. *lucifugus* Packard. Cave Fauna N. A. (1886), p. 65, pl. 16, fig. 1 placed in this genus provisionally by Packard. Kentucky.

Genus ANURIDA, Laboulbene.

72. *maritima* Guerin. Achortes maritimus Guer., Iconog. du Regne Animal, Texte Explic; Lipura maritima, Lubbock, Monog. Collem. and Thysan., (1873), p. 193, pl. 47; Anurida maritima Laboul., Ann. Soc. Ent., France, (1864); Packard, Syn. Thysan. Essex Co. (1873), p. 28. Europe, Eastern Coast of U. S.

Genus ANOURA, Gervais.

73. *gibbosa* Packard. (!) Syn. Thysan. Essex Co. (1873), p. 27. Maine, New York.
74. *granaria* Nicolet. (!) Ann. Soc. Ent. France (1847), p. 387; anurida granaria Tullberg, Skand. Podur. of. Underfam. Lip. (1869), p. 20; Anoura granaria Lubbock, Monog. Collem. and Thysan. (1873), p. 198, pl. 49. Europe, Ohio.

THE GENUS PACKARDIA G. & R.

BY HARRISON G. DYAR.

In the Trans. Am. Ent. Soc. I offered a revision of the species of this genus, in which I reduced the number of species to five; but, from recent experience, I am of the opinion that this number will have to be still further reduced. I have bred a moth that forms an intergrade between *P. elegans* and *P. fusca*, and have noticed no difference between the larvæ that produced typical *elegans* and *fusca*. The same is true of larvæ that produces *geminata* and *albipunctata*. Therefore, if I am correct, the species of *Packardia* must be reduced to two, as follows. I regard the evidence as conclusive concerning the synonymy of the first species: that of the second, being more involved, is less certain, especially as I have bred but few of the moths, though I have little doubt but that it will prove correct.

PACKARDIA ELEGANS Packard.

nigripunctata Goodell.*var. fusca* Pack.

Larva.—Head retracted under joint 2; joint 2 partly under joint 3; dorsal region narrow; body highest at joint 7, rounding to the extremities. Subdorsal ridges distinct, not raised, segmentally undulate, approaching each other posteriorly and marked with a yellow line which begins on joint 3, not joining over the dorsum. Sides nearly perpendicular, a little sloping and bulging superstigmatically, but not forming a decided lateral ridge; joint 13 produced into a rather long, narrow, pointed tail, marked with reddish purple above. Body closely covered with small transparent granulations; colour, light yellowish green, dorsal region dark green, with a small dorsal dot on each joint (joints 6–11) largely surrounded with pale yellowish green, reaching to the subdorsal lines except on joint 11. Sides nearly uniform yellowish green; above the lateral bulge is a segmental row of depressed darker spots, beginning on joint 4 and becoming indistinct after joint 9; on the lateral bulge a row of yellowish spots on joint 6–9. Spiracles white, small, round, conically elevated. A white line borders the venter, which is colourless. Thoracic feet small, abdominal ones wanting as usual in the subfamily. Head green, jaws brown, ocelli black. Length of larva 11 mm., width 5.5 mm., height 3.5 mm.

The subdorsal and lateral ridges have traces of tubercles, not elevated, but a little smoother than the rest of the body, bearing very minute short setæ, just perceptible with a lens in certain lights. These represent the tubercles of the following species:—

PACKARDIA GEMINATA Packard.

Var. albipunctata Pack.*ocellata* Grote.*goodellii* Grote.

Larva.—Body elongate elliptical, sides nearly perpendicular, slightly ridged above the spiracles; dorsal region flat, highest at joint 7 and sloping each way; subdorsal ridge moderately prominent, straight; joint 13 prolonged into a pointed tail very faintly marked with reddish toward the end. Along each subdorsal ridge is a series of little conical tubercles (seen with a lens), two per segment, close together and each bearing a very short seta; a similar row along the superstigmatal ridge, but single and smaller, and the setæ even shorter and finer than those on the sub-

dorsal ridge. A series of dorsal and lateral depressions, not distinctly different from the rest of the body in structure or colour, though the lateral ones are slightly darker. The body is thickly covered with little transparent granulations. Colour, pale, decidedly whitish green (not yellowish), a white line along the subdorsal ridge bordered above with dark green, the lines obsoletely connected on joint 3, but not passing on to the tail. A row of obscure white dashes along the superstigmatal ridge, looking as if beneath the surface of the skin. Spiracles small, round, projecting, white. A faint whitish line separates the clear colourless venter from the body. Head pale green, the mouth parts largely dark brown. It is retracted below, and folded within joint 2, which has the spiracle somewhat flattened. Length of larva 14 mm., width 6.5 mm.

Food plants of both species of *Packardia*, various deciduous trees.

It may be that *P. albipunctata* is distinct from *P. geminata*, but the only difference of importance is the colour of the secondaries, which are pale in the latter and nearly black in the former; but I have not been able to distinguish the larvæ. *Ocellata* and *goodellii* might be considered as varieties of *albipunctata* with the primaries respectively paler and darker than in the typical form.

DESCRIPTIONS OF SOME BUTTERFLY LARVÆ FROM YOSEMITE.—IV.

BY HARRISON G. DYAR.

Heterochroa californica Butler.

Egg.—Nearly spherical, flattened a little at base; covered with hexagonal elevated reticulations, from the intersections of which arise short spines. Colour uniform leaf-green, with a silvery lustre; width 1.5 mm. Laid singly at the tip of a leaf on the upper side. Duration of this stage eleven days.

First larval stage.—Head large, round, flat on the posterior side, roughened with a few little tubercles that bear minute setæ. Colour pale wood-brown, not shiny, the mouth parts dark brown and ocelli black; width 1.1 mm. Body cylindrical, with short conical tubercles and many minute granulations, each with a minute seta. The subdorsal tubercles on joints 3, 4, 6 and 12 are larger than the others and shaded with blackish. Colour leaf-green, the tubercles and all of joints 12 and 13 pale

yellowish. Feet concolorous with the body. Length on exclusion from the egg, 4.5 mm. The larva builds a perch at the end of a leaf in the manner of *Limenitis* larvæ.

Second stage.—Head large, rounded, densely covered with conical tubercles, with three spines arranged in a triangle at the apex of each lobe; pale greenish, with a brownish tinge, and two brown shades, one before and one behind the eyes on each side, running nearly to the vertex. Clypeus small, triangular, pale; jaws brown, ocelli and the three apical spines black; many of the longer tubercles at the sides of the head are tipped with black; width 1.8 mm. Body of uniform width, densely covered with yellowish conical tubercles and a subdorsal row of tuberculated processes, those on joints 3, 4, 6 and 12 much larger than the rest (especially the one on joint 3), and ending in four or five black conical spines. Colour pale brownish yellow, paler subventrally, with indications of a blackish subdorsal band. As the stage advances the dorsum becomes shaded with brown.

Third stage.—Head larger than the body, flat behind and somewhat flattened in front, not bilobed, but central suture depressed; clypeus small, densely covered with tubercles and a double row of long conical spines along the sides and over the vertex; another spine below the vertex of each lobe, and a large rounded tubercle above the ocelli. Reddish brown, the clypeus, a band on the ocelli tapering upward to a point, and all the tubercles and spines yellowish-white; ocelli and the tips of the vertical and lateral spines black; width 2.8 mm. Body as before, densely tuberculated, many of the tubercles in the subdorsal and subventral regions partaking of the character of branching spines. On joints 3, 4, 6 and 12 are a pair of large, thick, subdorsal processes (2.5 mm. long), covered with granulations and large conical spines like those on the head; on joints 8 and 11 a smaller but similar pair. General colour light reddish-brown, with a greenish tinge, especially on the sides. The processes are brown, most of the tubercles and spines yellowish, but the larger spines are tipped with black. Traces of a black subdorsal line and black dorsal marks between the long processes.

Fourth stage.—Head very large, flattened before and behind, almost disc-like, not bilobed, the outline from in front obtusely conical; clypeus rather small; median suture deeper on the vertex than elsewhere. Front nearly smooth, with only a few slight granulations, but around the lateral edge and vertex is a double row of long spines, the vertical ones most

prominent, all intermixed with many shorter tubercles, much as in the previous stage. Colour brown with a pinkish tinge in front, pale behind and below, a tapering whitish band over the ocelli and another obscure one on each side of the clypeus; labrum white; ocelli black; the spines, except a black one below the apex of each lobe, yellowish-white; width 4 mm. The jaws are greenish, black at base and tip. Body densely covered with small, conical, pointed, yellowish tubercles on an olive green ground, which gives it a beautiful mossy green appearance; along the subventral fold these tubercles are very long and thick, which gives the appearance of a yellowish subventral line. The region below this, the legs and venter are brown. A lateral row of super-stigmatal conical tubercles, one on each segment, larger than those covering the body; the one on joint 3 is branched, but there are none on joints 2 and 13. The subdorsal processes are very long and large, those on joints 3, 4, 6 and 12 the largest (5 mm. long), dark brown, covered with many conical thick spines of varying length which are white and tipped with black. On joint 2 there is no subdorsal process; on joint 5 only a slight tubercle; on joint 7 a somewhat larger one, which is branched; on joints 8 and 11 a moderate process (2 mm. long); on joints 9, 10 and 13 and on the anal plate is a branched tubercle. On the feet, and less distinctly also on the subventral region, short hairs arise from the granulations, but not elsewhere on the body. The spiracles on joint 2 are faintly black rimmed, the others concolorous with the body. As the stage advances the olive green colour assumes a rather lighter tint and shades into yellowish at the subventral row of spines. When at rest the head is turned down, the anal feet elevated, the processes on joints 3 and 4 point forward, those on joint 4 also projecting laterally, while the pair on joint 6 lean backward. At the end of the stage the larva fades to a uniform straw-yellow, the head pale brown, and spins its button of silk for suspension.

Chrysalis —Shaped somewhat as in *Limenitis*; a long pointed, tri-lateral, angular prominence over each eye; a carinated ridge runs the length of the dorsum, elevated into a prominence on the thorax posteriorly; on the anterior part of the abdomen is a flattened prominence, much as in *Limenitis*, but less disc-like, from which the ridge continues down the abdomen, ending two segments from the cremaster. Wing cases very prominent, projecting above the surface of the pupa, with an angular point at base and the outer margin elevated. Colour pale wood-brown,

with many short, darker brown strigæ; a dark brown tinge along dorsal line, the edges of wing cases and the points over the eyes. Between the thoracic and abdominal prominences, along the thorax laterally and back of the eyes are large yellowish-white metallic patches. Length, 23 mm.; width through wing-cases, 9 mm.

Food-plants.—Species of oak (*Quercus*.)

ON CATOCALA FLEBILIS AND C. FRATERCULA.

BY A. R. GROTE, A. M.

In describing *C. resecta* and *C. flebilis*, it appears, from Mr. Hulst's statements, that I included certain dark shaded specimens, one or more of *resecta*, under *flebilis*. Mr. Hulst says:—"The typical specimens in Phila. cover both species." This may be true, as also that Mr. Strecker figures a dark shaded *resecta* as *flebilis*. I have not his work. But there is no doubt in my mind as to what was *flebilis*, and there is no excuse for Mr. Hulst's renaming my species as *luctuosa*. Considerable material of *flebilis* from various sources was named by me at the time and notably for Mr. Angus, and there is no doubt as to my original intention. I noticed from the first the brown shade on primaries of *flebilis*, and imagined it might be accidental on my specimens and due to cyanide, as then we were hearing for the first time of the action of that poison on colour.

Without the slightest reason, Mr. Hulst quotes *fratercula* as the species intended by Guenee as *micronympha*. Under *sancta*, Mr. Hulst writes:—"Mr. A. G. Butler writes me this latter is *connubialis*, Guen., but the description does not fit, and it was described from a drawing, and so the name does not in any case hold." Without agreeing, this statement seems to me to apply to the use of *micronympha* for *fratercula*, and, in any event, I hope entomologists will not adopt these changes. Mr. Hulst has adopted, without acknowledgment, most of my corrections of his former work on this genus, as to the value of certain species and varieties, and one or two points of difference may be ultimately decided in his favour. I am, however, of a very strong mind upon two points, namely, that *C. residua* (photographed by me in Bull. Buff. Soc. Nat. Sci.) is a perfectly distinct species, and that the same is true of *Meskei*. Secondly, that my genus *Euparthenos* (Ann. Lyc.) is a valid genus, and the species *E. nubilis* structurally different from *Catocala*. I reserve until another occasion a criticism of Mr. Hulst's paper.

SOME BRITISH COLUMBIA COLEOPTERA.

BY THE REV. J. H. KEEN, MASSETT, QUEEN CHARLOTTE ISLAND, B. C.

Last year (1890) I spent the months of July and August at Inverness—a salmon-canning station at the mouth of the River Skeena, and paid what attention I could spare to the beetles of the locality, a list of which I give below. For the identification of my specimens I am indebted to the courtesy of the British Museum authorities at South Kensington. Some few species, it will be observed, still await complete recognition; meanwhile, the following list may not be without interest:—

<i>Cychnus velutinus</i> , Menetr.	<i>Coccinella 9-notata</i> , Hbst.
<i>Notiophilus sylvaticus</i> , Esch.	<i>Dermestes Mannerheimii</i> , Lec.
<i>Amara impuncticollis</i> , Say.	<i>Platysoma validum</i> , Esch.
<i>Bradycellus cognatus</i> , Lec.	<i>Peltis (Ostoma) ferruginea</i> , Linn.
<i>Stenolophus nigrinus</i> , Esch.	<i>Corymbites umbricola</i> , Esch.
<i>Amphizoa</i> (near <i>insolens</i> , Lec.)	“ (near <i>sagitticollis</i> , Esch.)
<i>Rhantus</i> (very near <i>divisus</i> , Aube.)	“ — (?)
<i>Acilius fraternus</i> , Harris.	<i>Melanophila atropurpurea</i> , Say.
<i>Gyrinus Sayi</i> , Aube (?)	<i>Eros simplicipes</i> , Esch.
<i>Cercyon limbatus</i> , Mann (?)	<i>Telephorus</i> — (?)
“ <i>adumbratum</i> , Mann (?)	<i>Aphodius</i> — (?)
<i>Necrophorus maritimus</i> (?)	<i>Tetropium</i> — (?)
<i>Silpha lapponica</i> , Hbst.	<i>Syneta carinata</i> , Mann.
<i>Anisotoma</i> — (?)	<i>Marolia</i> — (?)
<i>Creophilus villosus</i> , Grav.	<i>Dircæa</i> — (?)
<i>Quedius</i> — (?)	<i>Crymodes discicollis</i> , Lec. (?)
<i>Baptolinus melanocephalus</i> , Esch.	<i>Ditylus</i> — (?)
<i>Stenus</i> — (?)	<i>Cephaloon lepturides</i> , Newm.
<i>Tachinus instabilis</i> , Makl.	<i>Anaspis sericea</i> , Mann.
<i>Oxytelus fuscipennis</i> , Esch.	<i>Dendroides ephemeroides</i> , Mann.
<i>Amphichroum testaceum</i> , Esch.	<i>Hylobius pales</i> , Hbst.
<i>Homalium foraminosum</i> , Makl.	<i>Rhyncolus</i> (very near <i>brunneus</i> , Mann.)
<i>Anthobium pothos</i> , Mann.	<i>Tomicus interruptus</i> , Mann.

NOTES.

ASOPIA FARINALIS AS A CLOVER PEST.

In the proceedings of the Entomological Club of the A. A. A. S., at Washington, published in CANADIAN ENTOMOLOGIST, page 220, it is stated that I mentioned a suspicion that *Asopia farinalis* fed in clover, and asked if any one present had any knowledge of the matter. The circumstance shows the desirability of looking such questions up with some care before going on record, as I find that this habit has long since been observed and recorded. In French's Economic Entomology, Part II., Lepidoptera, 7th Rept. State Entomologist of Ill., p. 247, there is a statement that "Dr. Harris says of this that it may be found in old flour barrels; but, according to others, it feeds on corn, straw, and clover." In Tenth Report Ill. State Entomologist, p. 157, we find "Lives in a silken tube in old flour and old clover hay, sometimes burrowing into clover stalks. July to May. (D. W. Coquillett.)"

HERBERT OSBORN.

ULOHÆTES LEONINUS IN VANCOUVER ISLAND.

I have lately received from Mr. W. H. Danby, of Victoria, B. C., a specimen of the above-named Longicorn, which forms an interesting addition to our Canadian fauna. A drawing and description of the specimen were sent to Mr. E. A. Schwarz, of the Division of Entomology at Washington, who writes of it as follows:—"There is not the least doubt that your beetle from Vancouver Island is *Ulochates leoninus*, Lec., of the family Cerambycidae, a very rare insect, and one of the few short-winged species of this family in our fauna. The genus and species are described and figured by Leconte in "Report upon Insects collected on the Survey" (U. S. Pac. R. R. Exp. 47th Parallel), p. 62, pl. II., fig. 12. It is known to pass its stages under pine-bark. Dr. Horn's short note in Proc. Ent. Soc., Phila., VI., p. 293, is all that has been recorded on the habits of *Ulochates*." It is a large, handsome, yellow and black, hairy beetle, one inch in length, having much the general appearance of a staphylinid with long antennæ. The elytra are very short, the wings not folded at the tips, and the abdomen turned up at the end.

J. FLETCHER.

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The annual meeting of the Society was held in its rooms in Victoria Hall, London, on Wednesday and Thursday, Nov. 25th and 26th, the President, Rev. C. J. S. Bethune, of Port Hope, occupying the chair. The reports of the Council, Treasurer, Librarian and Curator, the Montreal Branch, the Delegate to the Royal Society of Canada, and those of the Botanical, Geological, Microscopical and Ornithological Sections were read and approved, and were ordered for publication in the Annual Report to the Legislature.

The following gentlemen were elected officers for the ensuing year:—

President—Rev. C. J. S. Bethune, M. A., D. C. L., Port Hope.

Vice-President—W. Hague Harrington, Ottawa.

Secretary—W. E. Saunders, London.

Treasurer—J. M. Denton, London.

Directors—Division 1—James Fletcher, F. R. S. C., Ottawa.

“ 2—J. D. Evans, Sudbury.

“ 3—Gamble Geddes, Toronto.

“ 4—A. H. Kilman, Ridgeway.

“ 5—J. A. Moffat, London.

Librarian and Curator—J. Alston Moffat, London.

Editor of the CANADIAN ENTOMOLOGIST—Rev. Dr. Bethune.

Editing Committee—H. H. Lyman, Montreal; J. Fletcher, Ottawa; Rev. T. W. Fyles, South Quebec.

Delegate to the Royal Society of Canada—The President.

Auditors—J. H. Bowman and W. E. Saunders, London.

A public meeting was held on Wednesday evening, at which the President delivered his annual address, in which he dealt especially with the chief insect attacks of the year, and the best modes of dealing with them. Papers were read and addresses given by Mr. Lyman on “Can Insects Survive Freezing?” and “Pamphila Manitoba”; by Rev. T. W. Fyles on “The Larch Saw-fly—*Nematus Erichsonii*”, and “The Larva of *Gelechia gallæ-diplopappus* and its Parasites”; by Mr. Harrington on “Insects Collected and Observed in Japan”; by Mr. Fletcher on “A Visit to Mr. W. H. Edwards”; by Mr. Geddes on “Entomology in Germany”; by Mr. Moffat on “Microscopical Observation of an Unexpanded Wing of *Callosamia promethea*”. Many specimens were exhibited in illustration of the various subjects brought before the meeting, and interesting discussions took place upon them. Full reports, with the papers in detail, will be given in the forthcoming Annual Report. The meeting was highly successful and enjoyable, and was very well attended.

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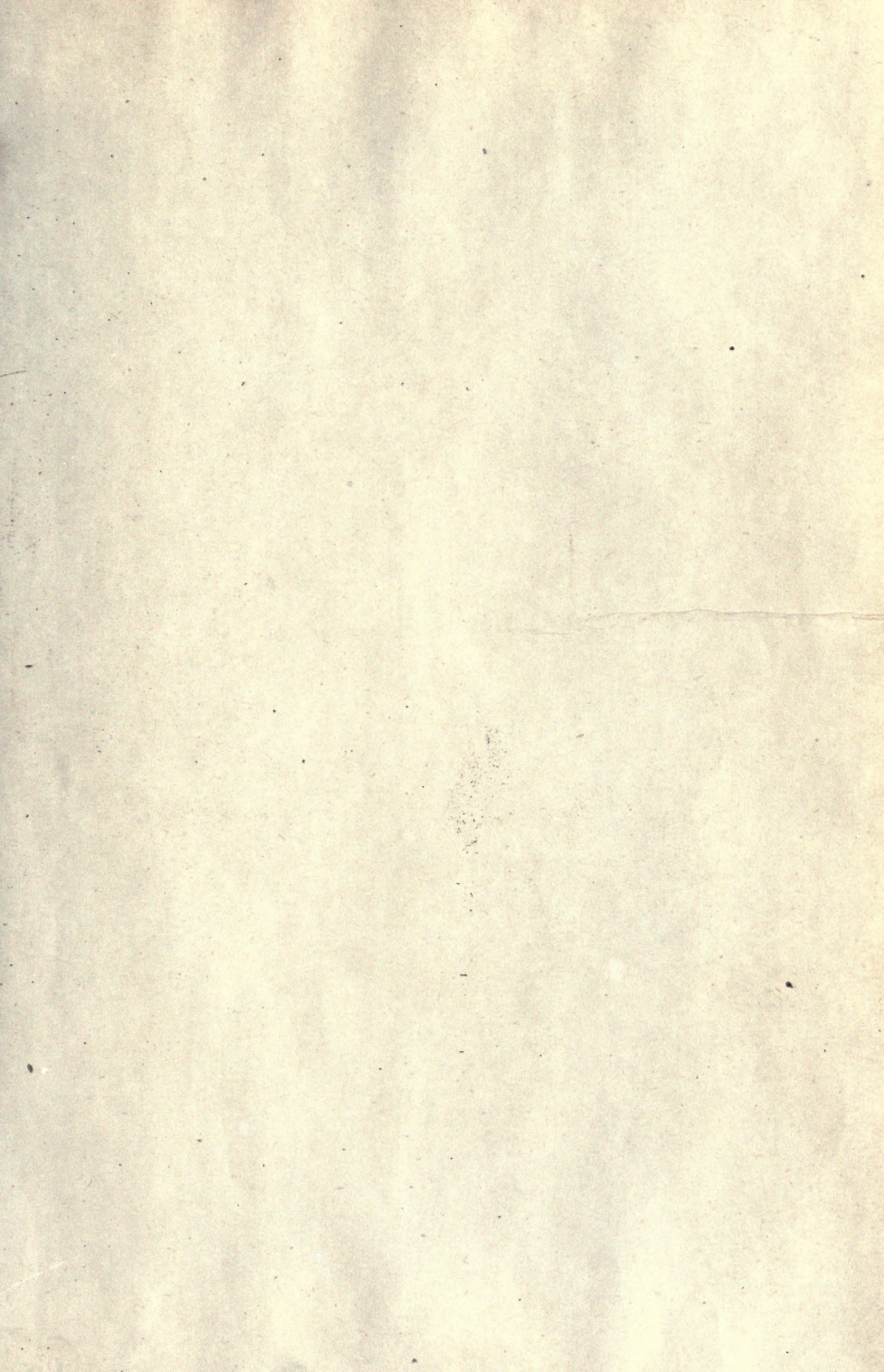
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